Pests

AND THEIR CONTROL

1941
OCTOBER
VOL. 9 NO. 10

ORGAN OF THE PEST CONTROL INDUSTRY

Exterminators
Fumigators
Termite Control Operators
Entomologists
Insecticide and Supply Mfgrs.

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CONTROL HIM WITH "CYANEGG"-HCN FUMIGATION!

THE adult grain weevil carries a can opener in his snout to puncture kernels of wheat and other grains. This efficient tool makes it possible for the weevil to lay eggs in grain foods, and, unless controlled, to do millions of dollars worth of damage in places where food is stored.

The destructive weevil and other pests can be controlled with properly applied HCN gas. And pest control operators know from experience that "Cyanegg" is an economical and an effective way to generate HCN gas.

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A DEPENDABLE, ECONOMICAL SOURCE OF HCN FUMIGATING GAS

The Central Rubber Products Co., Inc., New York

extends its Good Wishes and Greetings to the Pest Control Industry on the occasion of the Ninth Convention of the N. P. C. A. in San Francisco . . . .

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2. Gun-breech threads prevent nozzle from working loose.
3. Bulb of seamproof construction.
4. Screen-filtered powder insures free-flow.

CENTROBULB SIZES: SERVICE, 8-OZ., 4-OZ.

CENTROBULB prices that will please you, on request.

CENTRAL RUBBER PRODUCTS CO. Inc.

821 BROADWAY **NEW YORK, N. Y.**

Pests

and Their CONTROL

COOPERATING WITH NATIONAL PEST CONTROL ASSOCIATION

Exterminators, Fumigators, Termite Control Operators, Entomologists, Insecticide and Supply Manufacturers

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Three classes of membership: Active, Associated and Allied. ACTIVE MEMBERSHIP includes all firms engaged in any type of Pest Control operations (general extermination, fumigation, termite control, moth proofing) and dues are $15.00 per year. ASSOCIATE MEMBERSHIP includes branch offices of Active members and yearly dues are $10.00. ALLIED MEMBERSHIP includes manufacturers and supply houses.

STATEMENT

The National Association appreciates the co-operation given by way of publicity. The Association is not responsible for articles published unless credited to the Association. The list of officers and directors is published for informational purposes only.

For further details, communicate with
WILLIAM O. BUETTNER, *Secretary*
3019 Fort Hamilton Parkway **Brooklyn, New York**

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"Contributed articles in this publication do not necessarily reflect the opinions of the editors. The editors invite discussions, comments and all types of literary material pertaining to pest control and pests from any person interested in the advancement of the field."

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EDITORIAL

Resolution for the Pest Control Industry

WHEREAS, the 1941 N.P.C.A. Convention will be held at the Hotel St. Francis, San Francisco, California, October 27, 28, 29 . . .

WHEREAS, Convention time is a good time for retrospect and prospect . . .

WHEREAS, the Convention slogan is: ONCE IN A LIFETIME SEE CALIFORNIA AND THE PACIFIC COAST . . .

WHEREAS, the practical benefits to be obtained from Convention attendance will transcend any cost or sacrifice entailed . . .

WHEREAS, there is in project an absorbing program of papers, clinics, discussions, ranging from pest control in defense to technical phases in pest control, which will be led by a noteworthy group of specialists—to say nothing of the round of social activities in prospect, with every minute provided for and never a dull moment promised . . .

BE IT RESOLVED, THEREFORE, that PCO's everywhere suspend all business and social activities on the home front for the duration, in order to be present early on Monday morning, October 27, when the Chairman's gavel clicks the opening of the Ninth Annual N.P.C.A. Convention.

Ladies—Ladies—Ladies

And thus in part reads a broadcast addressed to the wives and sweethearts of the PCO's.

The coming Convention in San Francisco, California, on October 26-27-28-29, will be the best yet and one cannot afford to miss it!

CALIFORNIA PROMISES

C—"Colossal" Entertainment.
A—Adventure in Western Style.
L—Land of "Unusual" Sunshine.
I—Interesting Sight Seeing Tours.
F—Fun, Frolic and Fashion Shows.
O—Old Historic Places.
R—Romantic Old Mexico.
N—Notorious Chinatown.
I—Impressive Scenery from Sunkissed Beaches to Snow Capped Mountains.
A—Assurance of the Best Time You Ever Had.

Entertainment schedule starts on Sunday, October 26th, from St. Francis Hotel and continues throughout the convention with additional fun and sightseeing arranged for you on your visit to Los Angeles and the southern part of California.

Annand Named Chief, Hoyt Associate Chief, of Entomology and Plant Quarantine Bureau

THE recent announcement by Secretary of Agriculture Claude R. Wickard of the appointment of P. N. Annand as Chief and Avery S. Hoyt as Associate Chief of the Bureau of Entomology and Plant Quarantine is of welcome interest to the Pest Control Industry where both have long been familiar figures, and where both have contributed generously of their time and knowledge towards industry progress. Both appointments were effective August 16. Doctor Annand succeeds Lee A. Strong, who died June 2, 1941.

The best of all good wishes to Dr. Annand and Mr. Hoyt in their new posts. It is to be hoped that in spite of the enlarged scope of their activities, and the consequent demands such activities will make on their time, they will still find time and occasion to maintain their liaison with the industry.

Doctor Annand, who has been one of the assistant chiefs of the Bureau, was born in Telluride, Colorado, in 1898. He was graduated with a B.S. degree in 1920 from Colorado Agricultural College, where he specialized in entomology. He received an M.A. degree in entomology from Leland Stanford University in 1922, and a Ph.D. in zoology and botany from Stanford in 1928.

Before joining the Department of Agriculture staff in 1929, Doctor Annand did research work on sugar beet insects for a sugar company from 1920 to 1921, and was on the staff of San Mateo Junior College from 1922 to 1929. During the latter part of that time he was head of the college's department of biological sciences.

From 1934 until 1937 Doctor Annand was head of the Division of Cereal and Forage Insect Investigations of the Bureau of Entomology and Plant Quarantine. In 1937 he was appointed research assistant to the chief of the bureau. In April, 1939, he was named an assistant chief of the Bureau.

Doctor Annand is a member of the American Association for the Advancement of Science, the American Association of Economic Entomologists, the Entomological Society of America, and the Washington Entomological Society.

Mr. Hoyt also was an assistant chief of the Bureau. He was born in San Diego, Calif., on September 16, 1888. He graduated with the B.S. degree from Pomona College in 1910. He held various positions under the State Department of Agriculture of California and was made Assistant Director in 1929 and Director in 1931 in which year he severed his connection with the State Department of Agriculture and became Assistant Chief of the Plant Quarantine and Control Administration, of the United States Department of Agriculture, which position he held until the consolidation of that Bureau in 1934 with the former Bureau of Entomology into the present Bureau of Entomology and Plant Quarantine.

"One cloud is enough to eclipse the whole sun."

Nine Spoke Wheel to Symbolize Program of Ninth N. P. C. A. Convention

San Francisco, Calif., Hotel St. Francis, October 27, 28, 29, 1941

WITH PCO's more interested than ever to devise effective ways and means to combat infestations; with nine N.P.C.A. conventions as a background reminder; with the pests to be eliminated, or controlled, as a sort of a hub around which the program is to revolve—a nine-spoke wheel has been drafted as a symbol of the industry and its convention program with each spoke to represent a title for one of the important subjects on the agenda. Since a wheel can be no stronger than its weakest spoke, it follows that each spoke must be prepared to take up its share of industry stress and strain in order that the wheel may be strong enough to crush pests.

The Nine Spokes in the Program Wheel of the Pest Control Industry Follow:

Monday Morning, October 27, 1941
(Reconvenes Promptly at 2 P. M.)

Spoke No. 1—"COMMON HOUSEHOLD PESTS." Professor J. J. Davis, Chairman; Al Forde, Robert E. Hackley, Ernest M. Mills, Arnold Mallis, E. E. Horn, Harold Haecker.

(This program is to be developed by J. J. Davis calling upon PCO's to contribute practical experience.)

Spoke No. 2—"LEGISLATION." William O. Buettner, Chairman; Max J. Levy, Wayne K. Davis.

"Wage and Hour Law," H. K. Steckel.

"California Structural Pest Control Law," William Hogan.

Tuesday Morning, October 28, 1941

Spoke No. 3—"TERMITES, WOOD-BORING INSECTS AND FUNGI." F. K. Harder, Chairman; W. J. Burgin, J. R. Franklin, Ernest G. Barber, Ernest Ford, J. E. McNatt, Harry Tanner.

Spoke No. 4—"NATIONAL DEFENSE IN RELATION TO PEST CONTROL." George A. Rader, Chairman.

Tuesday Afternoon, October 28, 1941
(Session Reconvenes Promptly at 2:00 P. M.)

Spoke No. 5—"PUBLIC RELATIONS." Ernie M. Mills, Chairman; Lee Williams, Morten Prescott, Louis Gatto, Lee Christensen.

Spoke No. 6—"RESEARCH." P. Calvert Cissel, Chairman; William O. Buettner, Peter Ting, Wallace Tanner, D. B. Mackie.

Wednesday Morning, October 29, 1941
(Session Opens at 9:00 A. M.)

Spoke No. 7—"BUSINESS PRACTICES OF OUR PROFESSION." Jess M. Miller, Chairman.

Office Forms, Contracts, Letterheads, etc., Louis Kotler.

Cost Analysis and Overhead Expenses, Robert C. Yeager.

The Inter-workings of a Pest Control Business, G. Ray Lovejoy.

Relationship of a Pest Control Business to the Public, Elmer A. Roberts.

Advertising of a Pest Control Business.

Wednesday Afternoon, October 29
(Session Recovenes at 2:15 P. M.)

Spoke No. 8—"PRODUCTS AND SUPPLIES." Martin T. Meyer, Chairman; E. F. Sennewald, Charles W. Houghton.

Spoke No. 9—"FUMIGANTS AND UNUSUAL INSECTS." F. E. Bohman, Chairman; Mrs. Wilbur F. Smith, J. J. Davis, Robert Loibl, Sr., S. S. Heaton.

Other Important Speakers Scheduled To Appear

Dr. P. N. Annand, Chief, or Avery S. Hoyt, Associate Chief, of Bureau of Entomology and Plant Quarantine, Washington, D. C.

Honorable Angelo J. Rossi, Mayor, City of San Francisco, California.

Dr. Thomas E. Snyder, Senior Entomologist, Bureau of Entomology and Plant Quarantine, Washington, D. C.

Professor William B. Herms and Dr. Guy F. MacLeod, The University of California, Berkeley, California.

Dr. Alvin J. Cox, Bureau of Chemistry, Sacramento, California.

Professor J. J. Davis, Purdue University, Lafayette, Indiana.

W. E. McCauley, Velsicol Corporation, Chicago, Illinois.

Esler Johnson, President, Pacific Insecticide Institute.

Dr. J. C. Geiger, Department of Health, San Francisco, California.

Harold R. Hay, Peoria, Illinois.

Others are scheduled, but pending confirmation owing to National Defense program and pressing governmental and university activities, we hesitate mentioning their names.

An All-Around Program

General Chairman F. E. Bohman will bring the gavel down immediately following the singing of the "Star Spangled Banner" and invocation pronounced by Rev. Cecil G. Osborne at 9 o'clock. On Monday, October 27, at Hotel St. Francis the morning session will be given over largely to annual reports and important committee reports after Local Chairman Charles J. Menard has turned the convention back to L. R. (Dad) Alderman, President of the Association, who will preside at all sessions of the convention.

Centered around the nine spokes of the wheel (the program), many interjections will form a part of the three days' session as experiences of PCO's from all sections of the country are told. Throughout, the purpose is to get away from theory but to explain results achieved through various methods found successful and chemicals that played their part in the broad aims of our industry to eliminate and control primarily household and structural pest problems. It is for this reason that there is a minimum of prepared papers or addresses, but rather the emphasis is

on participation of the PCO who by "doing" and "experiencing" should have a more practical story to explain how he copes with the every day problems.

Interspersed are the speakers about whom comment has already been made and a mere glance soon reveals that the entomologists and other officials who are to address the convention have had intimate contacts with the PCO. Research brought up to date with the field experiences is bound to provide much valuable information and instruction in the technique of extermination and control that assures the investment of the trip repaying many times the few dollars and time taken out from one's individual business, no matter how far or how near one is to San Francisco.

And Who Is Privileged To Attend!

In a word the same privileges are extended this year as in previous years in that all individuals engaged in the business of household and structural pest control are welcome. Entomologists, public officials, and others who have contact directly or indirectly with problems of pest control are also welcome. A registration fee of $7.50 will be charged every person attending. Most of this registration fee goes toward entertainment features and includes the annual banquet on Wednesday evening.

Booth Exhibits

These have always been an outstanding feature of the annual conventions in that a splendid opportunity prevails to discuss with manufacturers and supply houses problems that involve chemicals and equipment. As we go to press we are assured that the following will exhibit:

E. I. Du Pont de Nemours.
Acme Protection Company.
Hudson Manufacturing Company.
U. S. Rodent Destroyer.
American Cyanamid & Chemical Corp.
Sennewald Drug Company.
Antimite Company.
Standard Oil of California.
Associated Chemists, Inc.
California Pest Control Association.
Tobacco By-Products & Chemical Co.
New York Pest Control Association.

Entertainment

As always, unique events take place. Every evening is crowded with activities. For example, on Monday there will be the famous "reunion" and instructional movies featured by the highly publicized color films produced by the California Pest Control Association under the direction of Harold Davies. Be on the lookout for a different Tuesday evening than has ever been attempted heretofore—no formal show or what one can attend most any time, but a series of "You Choose It" affairs. The famous Fisherman's Wharf, did some one say? Yes, and then some.

The annual banquet on Wednesday evening is always unique—most anything happens and naturally dancing forms a part of the enjoyment.

Ladies' Program

The ladies' program, guided by Mrs. Mildred Montgomery and her efficient committee, will include:

Sunday:

2:00 to 5 P. M.—Registration. Sightseeing.

Monday:

12:00 to 1:30 P. M.—Luncheon with men at Hotel St. Francis.

2:00 to 5:00 P. M.—

1. Guided tour of Chinatown.
2. Motor tour of Marin County.
3. Motor tour of the peninsula to Palo Alto.

Evening—The famous "Reunion" and general activities.

Tuesday:

10:30 to 4 P. M.—Bus tour of San Francisco, including luncheon at the Cliff House.

Wednesday:

12:30 to 2:00 P. M.—Luncheon and Fashion Show at Clift Hotel.

6:30 P. M.—Banquet at Hotel St. Francis.

And After the Convention

Everyone goes "Hollywood" or somethin'. Make no mistake about it, the industry in the southern part of the state has big plans. No one going to California can leave the state without visiting Los Angeles and Hollywood. President "Dad" Alderman hails from Los Angeles even if his firm has its main office in Pasadena (Rose Bowl fame) but the energetic group in the southern part of California will show you around. Indeed, Roosevelt Hotel in Hollywood will be the "Pest Convention Headquarters." And . . . .

PCO's and their friends registered at Roosevelt Hotel, Hollywood, October 31, and November 1 and 2, 1941, will be provided with Radio Broadcasting Program tickets, and taken on free automobile tours through movieland—guests of the Southern California PCO's.

A "Ladybug Night in Hollywood," Saturday, November 1, 1941, is now being arranged for all visiting PCO's. (Details, time and place will be announced at the convention.)

The committee in charge is composed of J. M. Miller, 1631 North LaBrea Avenue, Hollywood, Calif.; William Hogan, 150 East Glenarms Avenue, Pasadena, Calif.; A. A. Beliveau, 108 West Main Street, Alhambra, Calif.

All attending should know that travelling on regular round-trip tickets will allow for stop-over privileges so that we have purposely included the street addresses of the committee who will gladly assist in arranging itineraries.

Hotel Headquarters

The luxurious Hotel St. Francisco will be the headquarters where every convenience is assured. It is suggested that reservations be made in advance. Accommodations may be had from $3.50 and up for single rooms and $5.00 and up for double rooms with double beds and from $6.00 and up for double rooms with twin beds. Write directly to the hotel using the "form" card provided by the NPCA, or if you have no such card, one can be obtained from the Secretary at 3019 Fort Hamilton Parkway, Brooklyn, N. Y.

All Committees Active

The Ninth Annual Convention is bound to be successful and attendance will reflect the splendid arrangements and plans made by the following committees that have charge.

NATIONAL COMMITTEE: F. E. Bohman, *Chairman;* Louis Gatto, R. C. Yeager, Max Rukin, Ernest R. Barber, Charles W. Houghton, Louis Kolter, P. Calvert Cissel, O. W. Dickens, William O. Buettner.

OCTOBER "MUSTS" FOR PCO's

1. **Once in a lifetime see California and the Pacific Coast.**
2. **Attend the N. P. C. A. Convention at San Francisco, Oct. 27, 28 and 29.**

SAN FRANCISCO COMMITTEES: C. J. Menard, *Chairman*; A. T. Parsons.

EXHIBITS AND ADVERTISING: V. H. Montgomery, *Chairman;* E. G. Mills, William Hogan, A. L. Forde, N. E. Raleigh.

PUBLICITY: H. L. Davies, *Chairman;* J. K. Hougham, C. W. Mollard, J. J. Davis.

ENTERTAINMENT: Geo. A. Rader, *Chairman,* Harry Tanner, Jess M. Miller.

ATTENDANCE AND REGISTRATION: E. A. Roberts, *Chairman*; L. B. Williams, R. B. Loibl, W. J. Burgin, Walter B. Hill, J. R. Franklin.

RECEPTION: R. E. Hackley, *Chairman;* L. W. Christensen, D. C. Tracy, G. Ray Lovejoy, Carl Strom.

TRAVEL AND TRANSPORTATION: Martin Meyer, *Chairman;* J. E. McNatt, John P. Linn, H. K. Steckel.

SERGEANT AT ARMS: Arnold Alderman, *Chairman;* G. M. Culton, L. B. Williams.

LADIES' COMMITTEE FOR WOMEN'S ACTIVITIES: Mrs. V. H. Montgomery, *Chairlady*; Mrs. F. E. Bohman, Mrs. J. E. McNatt, Mrs. L. R. Alderman, Mrs. W. F Smith, Mrs. A. L. Forde, Mrs. J. M. Miller, Mrs. C. J. Menard, Mrs. L. W. Christensen, Mrs. C. W. Mollard.

L. R. Alderman, *President;* ex-officio member of all Committees.

Every man whom chance alone has made a public character, hardly ever fails of becoming, in a short time, a ridiculous private one.—Cardinal de Retz.

Vacuum Cleaner Can Banish Moths from the Greenhouse

Other Methods Used to Get Rid of Pests Include Painting the Heating Pipes With a Solution of Nicotine and Burning Dead Leaves

By George L. Abraham

Gardeners with a scientific turn of mind may be interested to know that a common vacuum cleaner can easily be rigged to rid greenhouses of moths responsible for the leaf tyer and leaf roller grubs. These moths usually enter greenhouses from outdoors and start laying eggs (500 to 700 eggs in three weeks per moth!) from which hatch grubs that do serious damage.

Carl Donhauser, a Long Island greenhouse operator who recently tried out the idea, uses an ordinary house vacuum cleaner to which is attached a 1¼-inch hose with a 4-inch brush on the end, but he believes a 6-inch brush would catch more moths "on the fly." Two persons are needed to operate the cleaner—one carrying the machine, the other manipulating the suction end. It is essential to disturb the plants to get the moths into action, as they hide under the leaves during the day.

Mr. Donhauser reports he has snared as many as seven moths at one time. A new idea which he feels will save him much time walking up and down the aisles is to burn a can full of tobacco stems at one end of the greenhouse, and have a large electric light bulb at the other end. The smoke from the burning stems drives the moths toward the light (a large single bulb), which also attracts them naturally, and by standing beside the bulb the operator can make the vacuum cleaner suck in the moths as they come along.

Most gardeners may not be aware that leaf tyers and real rollers are difficult to control, since arsenate sprays do not get the grubs until they have done considerable damage. Therefore, the best time to get them is in the moth stage before egg laying.

However, another Long Island greenhouse operated successfully checks moths and midges by painting his heating pipes with a nicotine solution, just after dark being the best time. He uses an oil can, to which is attached a wire guide so that it may be drawn rapidly along the top of the steam pipes, the aim being to create sufficient fumes to kill the moths; too little merely stuns them.

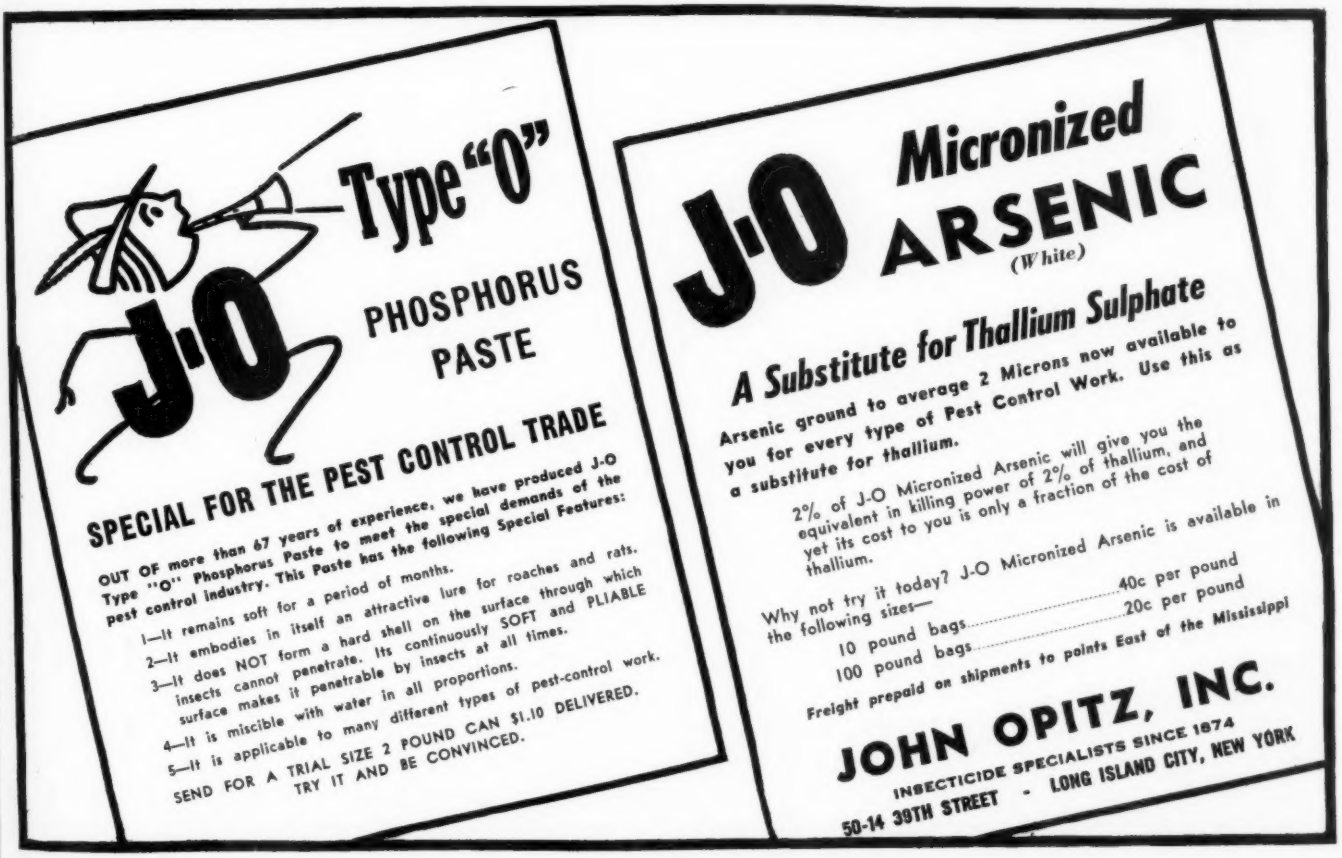
Dead greenhouse leaves should be burned also to combat moths.

It is generally understood that millers or moths are not themselves destructive, and their life is short. Evidence of their presence is found in the destructive rollers or tyers which, when they become noticeable, are preparing to enter the chrysalis (pupal) stage. From each pupa another moth emerges and continues the cycle, which occupies only about forty days. The main objective is to kill the moths before they can deposit eggs.

—*New York Times.*

Earthworms are blind and deaf, and a writer in Natural History compares their voices to water dripping from a leaky tap.

—*Science News Letter.*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Type "O"
PHOSPHORUS PASTE
SPECIAL FOR THE PEST CONTROL TRADE
OUT OF more than 67 years of experience, we have produced J-O Type "O" Phosphorus Paste to meet the special demands of the pest control industry. This Paste has the following Special Features:
1—It remains soft for a period of months.
2—It embodies in itself an attractive lure for roaches and rats.
3—It does NOT form a hard shell on the surface through which insects cannot penetrate. Its continuously SOFT and PLIABLE surface makes it penetrable by insects at all times.
4—It is miscible with water in all proportions.
5—It is applicable to many different types of pest-control work.
SEND FOR A TRIAL SIZE 2 POUND CAN $1.10 DELIVERED.
TRY IT AND BE CONVINCED.
J-O Micronized ARSENIC
(White)
A Substitute for Thallium Sulphate
Arsenic ground to average 2 Microns now available to you for every type of Pest Control Work. Use this as a substitute for thallium.
2% of J-O Micronized Arsenic will give you the equivalent in killing power of 2% of thallium, and yet its cost to you is only a fraction of the cost of thallium.
Why not try it today? J-O Micronized Arsenic is available in the following sizes—
10 pound bags ..... 40c per pound
100 pound bags ..... 20c per pound
Freight prepaid on shipments to points East of the Mississippi
JOHN OPITZ, INC.
INSECTICIDE SPECIALISTS SINCE 1874
50-14 39TH STREET - LONG ISLAND CITY, NEW YORK

Some Points of Interest In San Francisco

—And How To Reach Them

CIVIC CENTER. One of the most outstanding groups of civic structures in the world, consisting of the City Hall, the State Building, Federal Building, Exposition Auditorium, the two-building War Memorial (Veteran's Building and Opera House), the Health Center and the Public Library. (Reached by cars H, J, K, L, M, N, 5, 6, 7, 8, 9, 17, 19, 21. Motorists turn north off Market at Polk or Larkin.)

Chinatown. The largest Chinese community in the world outside of China. Chinese shops, temples, theatres. (Cars F, 15, Sacramento Cable, Powell Cable. Motorists turn north off Market at Grant.)

Latin Quarter. A bit of old Italy —famed for Bohemian restaurants and Italian dishes. (Cars F, 15, 16, Powell-Bay Cable. Motorists proceed out Columbus from Chinatown.)

Coit Memorial. On Telegraph Hill. Interesting murals of San Francisco on the Tower Walls; a breathless view of the actual San Francisco from the Tower's top. (Cars F, E, 15. Motorists east on Lombard off Powell.)

Fisherman's Wharf. A miniature Italian harbor, gay with color and activity, where crabs are cooked in sidewalk cauldrons. (Cars F, 15, Powell-Bay Cable. Motorists, the northern end of the Embarcadero.)

Aquatic Park. Outdoor swimming in San Francisco Bay; fishing from the Municipal Pier. (Cars F, 19. Motorists north on Polk to Bay.)

Fort Mason & Transport Docks. Scenic terraced military park where troop and supply ships load. (Cars H, F, 19. Motorists north to the end of Van Ness.)

Marina & Yacht Harbor. Beautiful, residence-lined Marina Boulevard bordering the Bay and the extensive Yacht Harbor, filled with sailing boats and motor craft of all descriptions. (Cars F, 22. Motorists drive west through Fort Mason.)

Palace of Fine Arts. Beautiful architectural masterpiece, built to house the Art Exhibits of the Panama International Exposition of 1915; now a permanent structure. (Cars F, 22. Motorists turn left of Marina Boulevard, west of Yacht Harbor.)

Presidio. United States Military Reservation of 1,540 acres, dotted with ancient gund left by early Spanish soldiers and powerful modern guns protecting the San Francisco shoreline. (Cars D, E, 3, 4. Motorists enter by proceeding to western end of Marina Boulevard.)

Golden Gate Bridge. The greatest single span bridge ever constructed, connecting San Francisco with Marin County on the north. (Cars D, E. Motorists reach bridge approach through Presidio, via Marina Boulevard.)

Lincoln Park. Contains an incomparable public golf links overlooking the Golden Gate and the Palace of the Legion of Honor. Western terminus of Lincoln Highway. Cars C, 1, 2. Motorists, west to the end of California Street, or through Presidio.)

Palace of the Legion of Honor. Museum housing treasurers in tapestry, painting and sculpture. (Cars C, 1, 2. Motorists follow main drive through Lincoln Park.)

Seal Rocks, Cliff House and Beach. Famed portion of the San Francisco shoreline. Amusement zone and Great Highway stretch to south. (Cars B, 2. Motorists follow drive from Palace of Legion of Honor, or approach from south up Great Highway.)

Fleishhacker Zoo and Swimming Pool. World-famed nine-acre zoo; world's largest swimming pool, filled with heated ocean water. (Cars L, 12. Motorists along Great Highway or west out Sloat Boulevard.)

Golden Gate Park. Acclaimed as the world's greatest man-made park. Miles of walks and drives lead to numerous attractions, worthy of a day-long visit. (Cars 4, 5, 7, 17, 20, 21, 33. Motorists via Great Highway or out McAllister from downtown.)

St. Francis Woods, Forest Hills. Beautiful timbered residential districts. (Cars K, L, 6, 10, 12. Motorists south on 9th from Golden Gate Park.)

Twin Peaks. Top is stopping point for breath-taking panoramic view of San Francisco and surrounding Bay Area. (Motorists follow signs from west end of Market Street, or approach from south via Portela Drive.)

United States Mint. Gibraltar-like new structure on a solid rock eminence at Duboce and Market. (Cars J, K, L, N, 6, 7, 8, 17. Motorists out to Market to Duboce.)

Mission Dolores. Founded in 1776 by the Franciscan Fathers; houses interesting relics of Spanish California; stands beside old cemetery. (Cars J, 10, 22, 26, 33. Motorists turn south on Dolores off Market.)

San Francisco-Oakland Bay Bridge. The mightiest bridge in the world, stretching 8¼ miles to Oakland and the other East Bay cities. (Motorists turn on Fremont off Market to on-ramp of Bridge.)

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The Hills of San Francisco

Rome has seven hills. San Francisco . . . twenty-two!

Travelers approaching the city from the bay or from the ocean see her silhouetted skyline as an undulating wave.

San Francisco's hills have played no small part in her history. Stories and legends have been built around them; and their gentle sweep, with the breath of the wind, have given her people a freshness and vigor noteworthy among the cities of the world.

As famous as Chinatown and the Ferry Building are the city's cable cars, essential because no other could make some of the grades. Early in the morning, late at night, the sing-song merry clang of these tiny cars climbing the spectacular hills play the "Symphony of San Francisco." "Tickets, please." San Franciscans clinging like flies to the sides of the miniature cars produce their fares somehow.

"Look out for the curve!" Swooping, the tiny vehicle swerves around a near right angle. It is better than the "scenic railway" and cheaper. Five cents. Visitors would do well to travel the cable car routes over the hills.

Let us take one up Powell Street from Market and get off at California street, where we will stand at the crest of one of the most famous of all the city's famed hills—Nob Hill.

Here, as practically anywhere in San Francisco, a breath-taking picture presents itself—a panorama of blue water, sky and hills, and the silver-spanned San Francisco-Oakland Bay Bridge gracefully arched across the bay.

Nob Hill, noted in the "old days" for the magnificent mansions of the bonanza kings and railroad magnates, still carries on the traditions of the past.

Exclusive apartment houses and de luxe hotels have, however, largely supplanted the palaces of former days.

The fire of 1906 destroyed all of the old dwellings except the pretentious brownstone mansion opposite the Fairmont Hotel which now houses the Pacific Union Club. Built in 1886 by James C. Flood, it was the only brownstone dwelling in San Francisco at the time.

The palatial Fairmont Hotel was erected by Mrs. Herman Oelrichs, daughter of James D. Fair, one of the bonanza kings. Fair had originally purchased the site for a home. The spot had, prior to this, served as a lookout.

Where the towering, graceful Mark Hopkins Hotel now stands, opposite the Fairmont, once was situated the handsome Mark Hopkins home. After the fire, an unpretentious building was thrown up on the foundations of the former mansion and the California School of Fine Arts, now in a beautiful structure at the foot of Russian Hill, was housed there.

The largest concrete apartment house on the Pacific Coast was the Stanford Court Apartments on the corner of Powell and California when it was erected in 1912. This is the former site of the Leland Stanford residence, one of the railroad kings, to the memory of whose son, Leland Stanford, Jr., University was founded at Palo Alto.

Another of the "Big Four" of railroad history, Collis P. Huntington, had his residence on Nob Hill. No structure remains now at the spot, but an inviting public park is there bearing his name.

Where Grace Cathedral raises its spires today, the two-winged mansion of Charles Croker and his son, William H., opened hospitable doors in the "old days." Nearby was also the residence of A. N. Towne, the only remains of which are the famous "Portals of the Past" which now adorn the banks of Lloyd Lake in Golden Gate Park.

It is difficult to estimate the many millions of dollars and the tremendous power wielded from the crest of Nob Hill in those "empire" days.

Another of San Francisco's hills, extending westward from Nob Hill, is Pacific Heights. Here the visitor will find the town houses of most of the city's very wealthy.

Rising almost sheerly from the bay front, like a promontory to the north and east of Nob Hill is famed Telegraph Hill. Like most of San Francisco's hills, this one played a necessary part in her early life.

Called "Loma Alta," High Hill, in the days of the Spanish and Mexican regime, it was christened its present name in the Gold Rush days because it was used as a signal station from which all incoming vessels were announced to the eager, excited San Franciscans. A flagpole erected in 1849 was augmented later by a semaphore which would signal the type of vessel and from what port it sailed.

As in those days, it is now populated largely by people of many nations, with the Italian predominating. Living in houses that cling amazingly to the cliff-like sides of the hill, the inhabitants lead an apparently carefree existence. Many artists and members of the city's true Bohemia live here.

Surmounting the hill is the beautiful Coit Memorial Tower, built at a cost of $125,000 and named after Mrs. Lillian Hitchcock Coit, who had willed $50,000 for the beautification of her beloved city.

Mrs. Coit was one of the picturesque figures of San Francisco. As a child she acquired a passion for following fire wagons and was given her honorary membership in the Fire Department when, in 1863, she helped pull Knickerbocker Engine No. 5 out of the mire.

The Coit Tower rises 189 feet and is 476 feet above the bay. Equipped with an elevator, it offers easy access to one of the world's most magnificent views. A winding but well-graded and paved road leads to the tower, and a broad plaza at its base affords an excellent parking place. Seated in their cars, motorists may gaze over a wide panorama of the bay unequaled for beauty.

Russian Hill, "across" from Telegraph Hill to the west, was named from an ancient Russian graveyard which has long since disappeared. Not so many years ago largely populated by artists and writers, it now boasts many handsome residences and apartment houses, which seem to vie with each other in reaching to the sky.

Although in the earliest days of San Francisco the fashionable residence district of the young city, Rincon Hill, south of Market, was left to a few old shacks and dilapidated buildings until engineers of the State of California cast an eye on it as a likely spot to anchor the cables of the great San Francisco-Oakland Bay Bridge.

In the process of building the gigantic concrete anchorage the hill

was largely demolished, but it still remains an excellent vantage point from which to watch the battle fleet or other things of interest in the bay or waterfront.

Highest point of all in San Francisco is Mt. Davidson, 927 feet above sea level, which now bears on its wooded summit what is said to be the largest concrete cross in the world. Over one hundred feet in height, its tip is more than a thousand feet above the sea which it overlooks. At Easter sunrise 50,000 San Franciscans climb the slope to worship at the cross.

Mt. Davidson is a part of the city's park system. Although almost in the heart of the city, it is difficult to realize, because of its ruggedness and dense timber. Graded, smooth walks and bridle paths, however, make it a happy spot for lovers of outdoors.

From the Ferry Building, at the foot of Market Street, one may glance up this world famed thoroughfare to a mountainous bulwark in the background.

This is Twin Peaks, exceeded in height only by Mt. Davidson. A road winds around the two odd-shaped peaks from Market Street and drops down the western slope toward the sea, where one of the city's fashionable residence sections nestles.

San Francisco, housing a population of over 700,000 has tucked her people away in her valleys and hillsides so cunningly that her bigness is scarcely noticeable.

Like all the hills, Twin Peaks provides an unsurpassed view of the city, ocean, bay, and the country to the east, north and south.

There are other hills to be but briefly mentioned, although all have their history and their beauty.

Lone Mountain, once surrounded completely by cemeteries, is now the site of a magnificent building housing a Catholic Girls' school. Fort Miley in Lincoln Park at the western entrance to the Golden Gate has a capacious, modern Veterans' Building and gives a fine view of the spectacular Golden Gate Bridge.

Other hills are Mt. Sutro (Sutro Heights), the wooded slope near the Cliff House; Lake View Hills; Buena Vista Park Hill; Bernal Heights and Bay View Hill at the south limits of the city; Ingleside Terrace; Stanford Heights; Strawberry Hill in Golden Gate Park; Hunters Point Hill, south limits; and Liberty Statue Hill in Ashbury Heights.

Because of her hills there is an ever-changing vista in San Francisco. Street cars climb recklessly over the slopes, and motorists think nothing of them. Visitors leave the city with their charm deep in memory.

In memory's book, when San Francisco comes again in retrospect, the tourist loves to think of her as the City of Hills.

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The Entomologist's View of the Field of Termite Control

By T. H. PARKS, *Extension Entomologist, The Ohio State University*

EDITOR'S NOTE: *The following are extracts from an address before the operators and guests of the Extermital Chemicals, Inc., Dayton, Ohio, July 25, 1941.*

AN ENTOMOLOGIST, through training and experience, is frequently able to help pest control operators, but cannot know all of the answers. He probably knows less about termite control, than an experienced termite control operator has gained through his daily contacts. Most extension entomologists are required to cover a broad field of insect control and the demands from the public are many, and they are increasing yearly.

Termite control operators must give the best possible service to their clients with no thought of taking advantage of the homeowner's ignorance of the problem. He must be a good salesman, but must match it with performance. I know of one operator that rates about 90% salesmanship, and 10% performance. This operator gets contracts easily, but has left many unsatisfied customers in his wake and incidentally has harmed the termite control industry.

The entomologist and the pest control operator should cooperate with each other in any way that will be for the good of the community and the industry. Meetings like this are bound to result in a better understanding between the two groups.

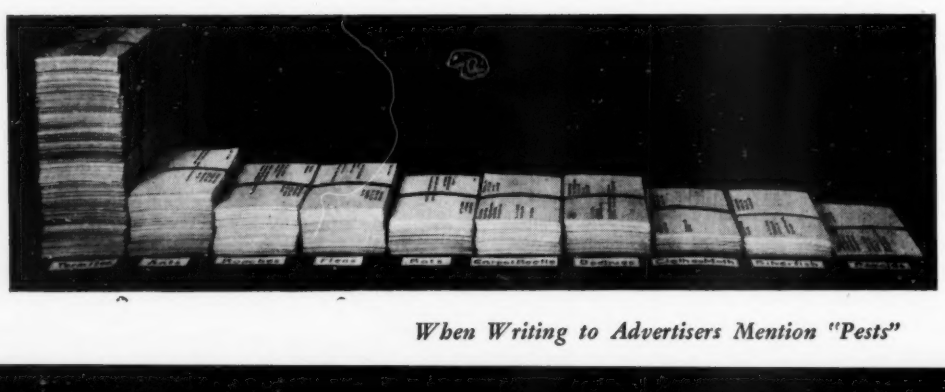
The public knows little about termites, or termite control. They are put in the place of doing lots of "listening." The sales talk of competitive termite control salesmen is controversial and confusing. By the time the homeowner has listened to three company representatives, he is ready to pour-out his confusion to the state, or extension entomologist. We discuss with him the problem of termite control, and give him literature on this subject. This should help him choose his course, or company. Under no circumstances do we criticize cost estimates. Price is a personal matter between the homeowner and the company. We do feel, however, that some operators are guilty of over-stating the seriousness of the problem, and too often attempt to frighten the prospect into signing.

We are mightily interested in the operator using approved methods, but must recognize that there is no "one" method of control that exactly fits all cases of infestation. Furthermore, there is no single method "approved by your state, or federal government." The National Pest Control Association has attempted to lay down a framework on which to build, and calls this the 1-2-3-3½ principles of termite control. First come reconstruction and replacements of the physical barrier type. Following this comes soil treatment with chemicals, and injection of the same through drilling and flooding, and otherwise treating foundation walls. The amount of each that needs to be done must vary with each building to be treated, because of conditions present. Soil types, soil moisture content, and exposure, also enter into the selection of the chemical to use; hence we believe that there is *no best* chemical to use in all cases. Some termite companies are unwilling to concede this point and in the opinion of the entomologists encircle too much "mystery and magic" about their chemical.

To what extent is the public "termite minded"? I may be able to throw some light on that question. We make an index card for each insect about which inquiry is made by letter. These files are complete for all correspondence received since 1918. Previous to 1926 my office records show that the citizens of Ohio were very little interested, or concerned with termites. Beginning in 1933 and continuing without interruption to the present time we have had many calls by letter and telephone asking for help in termite control. These come chiefly during April, May and June. We have received since 1920 more calls about termites than any other household pest. There have been three times as many requests as for any other household pest and they constitute 40.5% of the total number received. The photograph shows these correspondence reference cards classified and grouped according to their numerical order. Reading from left to right they are: termites, ants, roaches, fleas, carpet beetles, bedbugs, clothes moths, silverfish and psocids.

Last April I was asked to give a talk about termites over a large commercial radio station at Cincinnati. We finished by offering to send a free bulletin on termites to anyone, who would write to the station requesting the same. In response to this offer 502 requests were received for this bulletin. I have sent the bulletins and they went to seven states. The public is becoming termite minded and it is a subject about which they know very little.

The job of the entomologist is to give information helpful to the public. We do not attempt to evaluate pest control operators for your prospects. If for any reason we suspect that an operator is unfair, or is mak-



Card index of 1900 letters of inquiry received at the Ohio State University in which the writer asks for assistance in controlling household pests. Termite inquiries constitute 40.5% of the whole.

ing misrepresentations detrimental to both the public and the industry, we get facts and bring them to the attention of the office of the Better Business Bureau. From then on it becomes their duty to push the matter. We find these offices very willing to cooperate.

We are trying to educate the public to be better able to evaluate statements made about termites and to detect irresponsible operators hated by reliable pest control operators, as well as by us. Policing the industry is not properly our function.

What about the homeowner, who wants to carry out his own control operations? We encourage him to try, if it is apparent that the problem is not difficult. You must admit there are many cases where termites have been controlled by making a few structural changes, or repairs, that will break direct contact between soil moisture and structural timbers. These changes in many cases have resulted in freedom from infestation extending now well beyond the period of guarantee offered by local termite operators. You cannot blame an owner for making this attempt, if he does it right. If he fails, he is likely to become your client within a year, or two. Our follow-up shows that many are successful.

Termite control work is becoming well established, and is here to stay. The industry is still very young and "wobbles" a lot. The worst enemies it has are "exaggeration," "misrepresentation," and "injecting fear" into the minds of the prospect. It is within the power of the operators themselves to elevate it to a dignified and respected status.

Metropolitan Museum Shopping For Cheap Anti-Pigeon Gadget

Laurence S. Harrison, business administrator of the Metropolitan Museum of Art, said yesterday that while he desired to curb the activities of pigeons on ledges and copings of the museum building, there was no immediate plan to install a sharp-tooth device to achieve this purpose, particularly if the project should be expensive.

On Wednesday, C. R. Woodruff, of Albany, inventor of an anti-pigeon device consisting of strips of brass edged with sharp teeth, disclosed that Mr. Harrison had written for an estimate of the cost of outfitting the museum building with these strips. Mr. Woodruff said in Albany that he had replied by letter to Mr. Harrison that he was too busy installing the device on the exterior of the State Capitol and other large buildings to undertake the museum job.

Mr. Harrison said yesterday that he had not received Mr. Woodruff's letter and that he was merely shopping for prices of various anti-pigeon gadgets. He said that, although the museum was troubled with hordes of pigeons and starlings, he was not "actively interested in the thing" and that the museum would not spend a lot of money on Mr. Woodruff's invention.

The American Society for the Prevention of Cruelty to Animals showed much interest in Mr. Woodruff's statement that his sawtooth arrangement would soon be installed on many large buildings. Sidney H. Coleman, executive vice-president of the society, said that Mr. Woodruff's device would be investigated with particular attention to its gummy wax auxiliary to make the feet of the birds so uncomfortable as to chase them away.

It was explained that there are many "pigeon proofing" methods in use to prevent pigeons from converting cornices into nesting sites. Several large buildings have erected small wire spikes on possible landing fields for pigeons and others have similar arrangements, all of which have been approved by the A. S. P. C. A.

Arthur L. Amundsen, an official of the society, said that another method which could be utilized to rout pigeons from areas where they are considered a nuisance was to obtain a permit from the Department of Health to trap the birds. The society, he said, snares the birds humanely and releases them in more welcome places. This system, he added, had proved successful.

—N. Y. Herald-Tribune.

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Relative Susceptibility of the Ootheca* and Adult Female of the German Cockroach to Liquid Household Insecticides

By BARBARA M. PARKER and F. L. CAMPBELL, *Ohio State University, Columbus*

THE adult female of the German Cockroach, **Blatella germanica** L., carries its ootheca until the eggs within it hatch. The ootheca of this species is therefore more exposed to the action of liquid insecticides directed upon the active insects than are the oothecae of other common species which are dropped and sometimes concealed by the females long before the eggs hatch. It is of practical importance to know whether the oothecae of the German cockroach may survive an application of spray sufficient to kill the females to which they are attached and to what extent a differential effect may occur.

The investigation of this question is complicated by the fact that certain sprays may cause the female to drop its ootheca prematurely (Woodbury, 1938). It was necessary, therefore, to study the hatching of manually detached oothecae as well as the hatching of oothecae dropped by the females as a result of insecticidal action.

Hatching of Manually Detached Oothecae.—Ross (1929) and Woodruff (1938) have observed hatching of manually detached oothecae of the German cockroach and found that the probability of hatching increases with the age of the oothecae at the time of removal. Both workers set an age limit below which no detached oothecae were seen to hatch.

In the present investigation a study was first made of the life history of the German cockroach as reared in the laboratory under conditions described by Woodbury (1938). Only data pertinent to the present question are mentioned here. It was found that the time elapsing from the appearance of the ootheca until normal hatching ranged from 17 to 28 days at 76 to 83° F. The approach of hatching is indicated by the development of a greenish substance in the alimentary tract of the embryos. This green band, already noted by Woodruff (1938) and others, may first be observed 6 or 7 days before the ootheca hatches. Woodruff stated that it usually appears 3 days before hatching and that oothecae removed from females before the appearance of this band invariably failed to hatch.

To check the observations of Woodruff and of Ross, the oothecae were removed from 55 of 115 females. The remaining 60 bearing oothecae were held as checks, while the detached oothecae were placed in dry covered petri dishes which were kept in the laboratory. In 2 to 4 days the detached capsules had shrivelled and appeared incapable of hatching. Nevertheless they were kept under observation for 4 weeks together with the checks. Many of these shrivelled oothecae did hatch as shown in table 1, one of them hatching partially 24 days after it was removed from the female. As the check oothecae completed hatching 28 days after the beginning of the experiment, it is obvious that hatching may occur from oothecae that have been removed at an early age, long before the appearance of the green band.

The insects hatching from shrivelled oothecae were subnormal in size, but seemed normal in other respects. The percentage of detached oothecae hatching was less than that of the normal checks and partial hatching was more prevalent among the former. It is clear that removal of the oothecae did have a detrimental effect on hatching although the effect was much less than that indicated by previous workers.

Table 1.—Hatching of detached oothecae of unknown ages kept under laboratory conditions.

Number of Oothecae	Per Cent of Oothecae Hatching			Time Between Start of Test and Hatching of Oothecae
	Complete	Partial	Total	
55 (detached)	11	2	13	1- 7 days
	20	13	33	8-14
	5	7	12	15-21
		4	4	22-24
Total	36	26	62	1-24 days
60 (attached)	70	3	73	1-28 days

Table 2.—Hatching of detached oothecae of unknown ages kept in contact with physiological salt solution.

Number of Oothecae	Per Cent of Oothecae Hatching			Time Between Start of Test and Hatching of Oothecae
	Complete	Partial	Total	
150 (detached)	22	6	28	1- 7 days
	23	4	27	8-14
	8	5	13	15-23
Total	53	15	68	1-23 days
83 (attached)	76	2	78	1-30 days

Much additional experimental work was done on detached oothecae, but as the results may have little practical value, they are merely outlined here.

The shrivelling of detached oothecae under dry laboratory conditions is undoubtedly due to desiccation. It would seem, therefore, that if detached oothecae were kept in air saturated with moisture, shriveling would be prevented and the hatch improved. It was found, however, that shrivelling cannot be prevented in this way. On the other hand, if detached oothecae are kept in contact with liquid water, as, for example, on wet filter paper, shrivelling does not occur. On the contrary, oothecae so treated may swell noticeably, indicating that the ootheca is permeable to water. The percentage hatch of wet oothecae was not as great as that of dry oothecae, but partial hatching did occur from the former.

The foregoing observations indicated that the normal attached ootheca is in physiological equilibrium with the body fluids of the female cockroach, or, in other words, that the attached end of the ootheca is permeable to water in the body of the female. It seemed, therefore, that the best hatch of detached oothecae might be obtained by placing them in contact with a physiological salt solution. This was done by placing oothecae in closed Petri dishes on filter paper saturated with a solution described by Yeager & Hager (1934) and used

*The word ootheca is used in this paper to mean both the egg capsule and the eggs within it.

by them in experiments on the Oriental cockroach. Thereafter the filter paper was moistened from time to time with distilled water. Under such conditions it was shown that some oothecae can be caused to hatch when removed from the female within 24 hours after their extrusion from the insect. In another experiment on oothecae of unknown ages, similar in arrangement to that shown in table 1, a better hatch was obtained than that secured from dry oothecae. The results are given in table 2. The oothecae used in this experiment did not shrivel nor swell and the hatch more nearly approached that of the checks than was the case in any other experiment.

Observations made during the course of the foregoing work indicate that mating occurs about 6 days after the last molt of the female. The first ootheca appears about 4 days after mating. A female may form from two to seven oothecae during her life and one mating appears to be sufficient to fertilize all the eggs produced. It was of particular interest to note the effect of premature removal of the ootheca on the time of appearance of the next ootheca. The results, shown in table 3, indicate that if an ootheca is removed when it is less than a week old, a period of about 2 weeks elapses before the appearance of a second ootheca. The normal period of time between hatching of an attached ootheca and the appearance of the next is from 7 to 9 days. As oothecae are normally carried from 17 to 28 days, averageing 21 days, the removal of young oothecae actually accelerates the rate of egg production.

Table 3.—Time between removal of one ootheca and formation of the succeeding ootheca.

Number of Oothecae	Time (In Days) Between— Appearance of Ootheca and Removal	Removal of One Ootheca and Appearance of the Next Succeeding Ootheca (Average)	Appearance of First and Appearance of Second Ootheca (Average)
21	0	14.1	14.1
13	1	15.1	16.1
25	2	14.2	16.2
15	3	15.9	18.8
15	4	14.8	18.8
25	6	14.5	20.5
21	7	13.3	20.3
6	8	12.3	20.3
6	16	9.6	25.6

Effect of Liquid Insecticides.—With the exception of the Official Test Insecticide (O.T.I.) of the National Association of Insecticide and Disinfectant Manufacturers, all sprays used in this work were made by adding toxicants to a highly refined kerosene, the characteristics of which were listed by Woodbury & Barnhart (1939). The substances used and their concentrations and dosages are given in Table 4.

Female cockroaches bearing their first oothecae were selected for each series of comparative tests from a batch that had hatched on the same day.

The spray was applied by a settling mist method described by (Woodbury 1938). The untreated insects and untreated checks were placed for observation in half-gallon glass jars with food and water. Counts were made at the end of 24 hours to determine the number of dropped oothecae and the mortality among the females with or without oothecae. Insects still living at this time but unable to walk could be called dead. All oothecae with or without dead or living females were retained 4 weeks under comparable conditions for records on hatching.

The essential results of these tests are shown in table 4. At the concentrations used, the effective sprays

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were those that contained pyrethins or normal butyl carbitol thiocyanate, hereafter called "thiocyanate." Although both sprays exerted a marked paralytic effect on the insects, the pyrethrins caused a majority of the females to drop their oothecae, whereas the thiocyanate had no such effect. One must suppose that the pyrethrins cause muscular contractions that are not induced by the thiocyanate.

The results show that the loss of the ootheca by action of pyrethrins does not necessarily result in the death of the female; e.g., where 59 per cent of the oothecae were dropped only 45 percent of the females died and not all of these had lost their oothecae. If the environment in which these dropped oothecae lie should be unfavorable for further development of the embryos, one might get a higher kill of the oothecae than of the females. However, at higher dosages and concentrations, the kill of females by pyrethrins was markedly higher than that of oothecae. Moreover, there is no doubt that the pyrethrins exerted some direct insecticidal action on the oothecae as can be seen by comparing the mortalities of oothecae following pyrethrin treatment with that of the checks.

The thiocyanate was used at a concentration equivalent to 20 per cent of the commercial concentrate by volume. At this unusually high concentration it was the most effective spray against the adult female and was equally as effective as the pyrethrins in preventing the hatching of the ootheca. An ootheca attached to a dead female probably has little more chance of surviving than a detached ootheca. At the concentrations and dosages used the females were more susceptible than the oothecae.

With respect to the pyrethrins and the thiocyanate it may be concluded that the female German cockroach is more susceptible than the oothecae to applications that give a high kill of females, but that both sprays have an insecticidal effect on the oothecae.

In the second series of tests (table 4) cresylic acid was comparable in concentration to the thiocyanate. It is doubtful that it had any effect on the oothecae, though it may have been slightly effective against the adults. Rotenone likewise was of doubtful value at the concentrations used, which are comparable with those of the pyrethrins. The results on the relative effectiveness of pyrethrins and rotenone did not agree with those of Woodbury (1938) who found that these toxicants were equally effective against the second instar German cockroach. However, a different mutual solvent was used by the present writers as well as different stages of the insect. The kerosene itself had no demonstrable effect on the oothecae or the females.

When the foregoing work was being done, the writers knew that the resistance of the German cockroach to pyrethrum sprays increases in the order: Young nymphs, adult males and adult females (Woodbury 1938). When it was determined that the ootheca may be more resistant than the adult females, it was thought that the stage most resistant to pyrethrum sprays had been found. However, more recent unpublished work by T. T. Haack indicates that large nymphs are also more resistant than adult females. The relative susceptibility to pyrethrum sprays of large nymphs and oothecae is not yet known.

Summary.—Kerosene sprays containing extracts of pyrethrum gave a high kill of adult female German cockroaches, **Blatella germanica** L., when applied by a settling mist method at certain concentrations and dosages. Under this treatment the majority of the insects dropped their oothecae prematurely, no doubt because of muscular contractions induced by the pyrethrins. By comparing the percent hatch of oothecae so detached with that of oothecae manually removed from untreated females, it was shown that the pyrethrins exert some insecticidal action on the oothecae, but that the per cent mortality of oothecae was not so great as that of the females to which they had been attached. It was concluded that when a high kill of females is obtained by pyrethrum sprays, the females are more susceptible to this insecticide than are their oothecae. With the possible exception of the large nymphs, the ootheca is the most resistant stage of the German cockroach to pyrethrum sprays.

The effect of the pyrethrins on females and their oothecae was compared with that of other toxicants. At an unusually high concentration normal butyl carbitol thiocyanate gave about the same per cent mortality of females and oothecae as did the pyrethrins. However, this thiocyanate did not cause the females to drop their oothecae, although its paralytic effect was greater than that of the pyrethrins. It was concluded that this thiocyanate had some insecticidal value against the oothecae at the concentration used, but that the females were more susceptible than their oothecae.

At the concentrations used, cresylic acid was comparable to the thiocyanate and rotenone to the pyrethrins. Neither substance caused the females to drop their oothecae and neither caused marked mortality among the females or their oothecae.

In connection with the foregoing work, observations of biological interest were made. It was found that oothecae manually detached from females shrivel rapidly under room conditions, but nevertheless a shrivelled ootheca may hatch completely or partially, even when removed from the female soon after it is extruded. A better hatch may be obtained by keep-

Table 4.—Effect of liquid household insecticides on German cockroaches carrying oothecae.

Insecticide	Concentration in Kerosene	Number Insects Treated	Oothecae Dropped	All Oothecae Failing to Hatch	Adult Females Killed
	Mg. per c.c.		Per Cent	Per Cent	Per Cent
Dose about 1.2 mg. per sq. cm.**					
O.T.I. (pyrethrins)	1	273	82	60	77
Pyrethrins	2	273	95	64	96
Normal butyl carbitol thiocyanate	100	222	10	62	100
Cresylic acid	41	207	18	35	31
Rotenone*	1	223	20	31	18
Kerosene check	—	278	22	19	6
Untreated check oothecae attached	—	163	11	20	8
Dose about 0.8 mg. per sq. cm.**					
O.T.I. (pyrethrins)	1	119	59	47	45
Pyrethrins	2	118	82	53	83
Normal butyl carbitol thiocyanate	100	119	23	50	93
Cresylic acid	100	120	14	25	27
Rotenone*	2	116	15	29	26
Kerosene check	—	114	25	28	13
Untreated check oothecae attached	—	119	22	20	8
Untreated check oothecae detached	—	161	—	38	—

*A proprietary mutual solvent was used to keep rotenone in solution in kerosene.

**In table 4 of Woodbury's paper (1938), an error was made in pointing off the figures for dosage. The dose of O.T.I. required to kill 50 per cent of adult females should read 1.52 mg. per sq. cm.

ing detached capsules in contact with physiological salt solution, thus preventing shrivelling by simulating to some extent the condition of liquid transfer existing when the ootheca is normally attached to the female. Early removal of an ootheca accelerates production of the succeeding ootheca.—3-12-40.

Reprinted from Journal of Economic Entomology

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Yellow Lamps Are Rated Low in Insect Appeal

SCHENECTADY, N. Y.—After spending years learning what colors of light will attract bugs into death traps, scientists have begun to meet success.

The idea is to find the best light for human out-of-doors comfort at night. Lawrence C. Porter of the General Electric company at Cleveland and the Ohio agricultural experiment station have made a report.

They say they don't know all the answers, but that red attracts fewer insects than any other color. But because red is not altogether satisfactory to live under, or to use for a porch game of cards, yellow light tentatively is selected as the most satisfactory.

A flame-colored lamp is very satisfactory, so far as bugs are concerned, when some fair seeing is also wanted.

What the scientists now wish to find out is whether there is a difference between insect preferences for colors. They point out that gnats are more troublesome than June bugs, since the gnats bite.

Aside from the color differences, the most effective way to reduce the number of insects is to lower the wattage of the light. There is no such thing as a lamp that does not attract insects.—*Denver Post.*

Priorities

According to a recent item in the N. Y. Times, one result of the priorities confusion has been to lead to incorrect reports of production changes. Thus it was pointed out that a producer of formaldehyde, for example, cut his regular customers more sharply than was necessary when the priority was first established, and later was able to ease his restrictions. This led to reports that this producer had suddenly been able to effect a sharp increase in output.

The list of chemical materials now under priority regulations cuts horizontally across the chemical industry as a whole. The result is that virtually every company using chemicals at all is affected to some degree. Another result is that switches from a priorities chemical to another which might be more plentiful for the moment merely lead to addition of the substitute to the priorities list.

Where an industry uses a priority material essential to it but in relatively small quantity, it was believed there would be little difficulty in obtaining supplies unless the industry concerned also uses numerous other priorities materials.

Materials on the priorities list up to now include chlorine, formaldehyde, tricresyl phosphate, triphenyl phosphate, paraformaldehyde, hexamethylnetetramine, chlorinated hydrocarbon refrigerants, ethyl alcohol and related compounds, methyl alcohol, potassium perchlorate, potassium permanganate, toluene, magnesium, polyvinyl chloride, neoprene, boric acid and borax.

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PYRETHRUM OINTMENT

A Report on Its Use in the Control of Lice and Scabies

By WALTER K. ANGEVINE, M.D., *Medical Officer, Washington, D. C., Penal Institutions*

DURING the latter part of November, 1940, a survey made at the District of Columbia Jail showed that 7 per cent of the prisoners admitted during that period were infested with lice, and approximately 2 per cent were suffering from scabies. These averages were thought to be rather high, and in order to ascertain the degree of accuracy of this situation over a longer period, tabulations were made of the prisoners admitted from December 1, 1940, until April 12, 1941. During this period 6,676 prisoners were received. Of this group 1,504 were infested with lice of one or more species and 279 with the itch-mite, *Sarcoptes scabiei*, commonly referred to as scabies. This revealed a more startling picture. The averages here represent more than 22 and 4 per cent, respectively.

The alarming significance of these statistics lies in the fact that both the body and head lice transmit typhus, relapsing and trench fevers. They are transmitted by way of the excreta, the virus gaining entrance through the punctured wound made by the louse while feeding, or scratched in by the individual. Lice are equipped with three stylets inside of the mouth. They are long and sharp, and when protruded through the mouth orifice and apposed, make a tube through which a secretion from their salivary glands empty into the subdermal tissues of their host. The purpose of this secretion is to dilate the capillaries of their human victims so that the blood flows more freely. It is thus while they are feeding that excreta is passed which contains the virus transmittable through the punctured lesions of the skin. Mueller and Urizio, *Riforma med.*, 1919, 35: 734 demonstrated that typhus fever could be transmitted even without the bite of the insect. Mueller himself contracted typhus fever as the result of an accident, in which an emulsion of lice feces spilled on his hands, and the possibility is cited that syphilis and other infections may be transmitted mechanically by [illegible] as well as other biting insects. [illegible]ay seem pertinent when it is considered that 15 per cent of those committed to the District of Columbia Jail for felonies are diagnosed as having syphilis, some in the infectious stage.

The cases of parasitic infestation coming under the author's observation have been preponderantly *Pediculous Vestimenti* or *Corporis*. These are the clothes or body lice. The eggs or nits, which receive the cement material in the oviduct of the female are laid and firmly cemented to fibers of clothing or body hair. At ordinary temperatures which exist between the clothing and the body, they hatch in from seven to ten days. A complete cycle, from egg to egg, requiring about 16 days. The average life of the body louse is from 35 to 40 days, and the female under ideal conditions, may have as many as four thousand offspring during her lifetime.

Of the numerous parasiticides used orthodoxly in combatting such pests, none has been found by this writer to be as thoroughly efficient or as applicable for institutional use as pyrethrum. It is non-poisonous to all warm-blooded animals, including man, and may be ingested without any harmful reaction.

The ideal method of employing pyrethrum to eradicate pediculosis and scabies is by incorporating the toxic principles into an unguent. This must be prepared so that it is easy to apply, easily removed with the aid of soap and water, capable of being stabilized against rapid decomposition, and inhibitory to skin irritation. Unfortunately, the various pyrethrum concentrates obtainable on the open market do not lend themselves to these requirements, nor are they adaptable to pharmaceutical prescription. Judging by the inquiries made from the review "Pyrethrum in Medicine" *Medical Annals*, D. C., 1:21 (1941) and *Soap & San. Chem.* 3:101 (1941) on the subject of pyrethrinated ointment, it has become evident that this was not generally understood.

Of the various pyrethrum concentrates investigated in a series of experiments, each presented some objectionable factor, either from a chemical or dermatologic point of view. All were discarded in favor of the residue to be found after the pyrethrinated oleoresins are extracted from the chrysanthemum flowers by the cold process. This material, once a waste product before the advent of modern reclaiming methods, is a jelly-like mass consisting of involucral scales composed of scerenchyma, collenchymatous cells, pollen grains, fragments of the corolla and of its epidermis and papillae, together with large quantities of fats, waxes, fatty acids and other known and unknown substances. When the flowers used have been carefully selected, the unrecovered pyrethrins in this jelly will assay at approximately 6 per cent.

On the premise that so many individuals were known to be allergic to ragweed, and that both ragweed and pyrethrum were of the order *Carduales*, patch tests were made in an endeavor to locate the allergic substance. These patch tests definitely placed the pyrethum allergen in the resinous content, which when separated from the oleoresinous extract of pyrethrum flowers, gave skin reactions in 48 hours to 60 per cent of the individuals tested. The remaining 40 per cent represented a group both negative and failing to cooperate.

The pyrethrum jelly, or residual product of the cold extraction process represents a material from which most of the resins have been removed. Patch tests with this material gave further confirmation that the allergen lay in the resins. In the author's opinion, this pyrethrum residual jelly offers the ideal parasiticidal medium not only because it has been relieved of most of the resinous material in the extraction process, but because of its blandness

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Pyrethrins are rapidly decomposed by hydroxides, actinic light and oxidizing materials. These facts were carefully considered in the preparation of a pyrethrinated unguent so that the carrier aside from blending homogeneously, would be synergistic with the pyrethrum jelly. Petrolatum alone offered such a medium, in contradistinction to the hydrous wool fat used in the Sweitzer and Tedder experiments. The petrolatum must be of a high melting point in which many of the olefines have been distilled off, leaving more of the higher paraffin series of hydrocarbons. It may be recalled that these paraffin hydrocarbons can not be readily oxidized, lending, in consequence, antioxidant properties to the pyrethrins. The whole mixture has been found to be easily removed from the hair with the aid of soap and water and to exhibit a solvent action on the the "cement" by which nits are affixed to the hair structures.

In this investigation, the author was concerned in finding an inhibitory factor which might prevent such remaining allergic substances from entrance into the lymphatic circulation. Tests were made on the mesenteries, tongues and webbing of frogs and on the ears of white rats. Numerous vasomotor constrictors were used with a view to obtaining a topical, capable of constricting capillary action. On the theory that vasodilators should exhibit a constricting action in weak concentrations, many such substances were used in these tests. Crystalline dimethyl methylene ether of allyl tetroxybenzene appeared to produce this effect and was more prolonged in its action than the other chemicals used.

With these materials an unguent was prepared and termed A-200 Compound, for convenience. In order to determine its prophylactic properties against allergic reaction by adsorption, petrolatum (USP), pyrethrinated 2 per cent with commercial oleoresin of pyrethrum flowers was used for control, and patch tests were made with both materials. Twenty per cent reacted positively to the control in 24 hours, and 40 per cent had positive skin reaction in 48 hours. All were negative to A-200 Compound in 24 and 48 hours.

When this ointment is applied the lice curl and die within a few minutes. Even when spread lightly over infested areas tiny parasites may be seen to back out from their retreats and undergo convulsions. Since pyrethrum is a central nervous toxin to cold-blooded animals, death is preceded by paroxysms familiar to all who have watched its action.

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An important fact is that in the large majority of cases treated, a single application destroyed both the vermin and the eggs, and there is not one instance of dermatitis or skin irritation to report in the use of this compound. Its parasiticidal action is both spectacular and decisive and nits contacted with the unguent have failed to incubate, the miscroscopic studies revealing that they were disintegrated.

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Unique Automatic Rat Trap Invented

AN AUTOMATIC electric rat-trap of unique design and principle is of recent note. It is the Rochester Automatic Trap which is being produced commercially under the Vincent-Stanton patent, U. S. No. 2247931, and is, in outward appearance, a wooden tunnel, measuring 48 inches long, 21 inches wide and 15 inches high. It has no floor because when the surface upon which the rat is moving does not change he feels more secure in advancing forward. It is open at both ends because the rat is more willing to advance when he can see what lies ahead of him.

Midway along the side of the tunnel an infra-red (invisible) beam of light shines across the passageway to a photo-electric cell (electric eye). When the rat cuts across this beam, the circuit is broken and immediately trap doors drop down at both ends of the tunnel—and the rat is captured.

Caught in the tunnel of the automatic trap, the rat finds one means of egress—an easy one. A small ramp leads upwards to a chamber above. He scurries up the ramp, enters the chamber, and stepping upon the floor, makes an electrical contact, which drops the door behind him, barring any return.

From this point the rat proceeds to take the only route left open to him, a small passage leading to the six-stalled death chamber. Enroute, he steps upon a switch plate which not only rises behind him to block any retrogression but also—inasmuch as this particular rodent's end is near—sets in operation a release mechanism that opens up the tunnel "downstairs" for the next victim. He has no alternative but to choose one of the six innocent-looking electrically-charged stalls. Once he enters the stall he receives from top, bottom and both sides a 110-volt charge—not enough to burn or sizzle him, but enough for the kill.

The whole operation, from start to finish, takes far less time than it does to read about it—it is claimed. Only five seconds, from "electric eye" to electric shock. The death chamber is removable, like a drawer, so the corpses can be dumped without anyone having to touch them.

According to Vincent and Stanton, the inventors, the death of one rat has absolutely no influence upon those that are to follow.

The foregoing material has been excerpted from a press-release issued by the manufacturer of the trap, and its publication here is intended for your information only and is not necessarily to be construed as a recommendation on our part of the trap's efficiency. A more comprehensive article from a consumer angle on the trap appeared in the Democrat and Chronicle Magazine Section," Rochester, N. Y., September 7, 1941, under the title "They Built a Better Rat-Trap" over the signature of Edmund W. Peters.—Ed.

Judgment of people is often wiser than the wisest men.—KOSSUTH

Why the Increase in Insecticide Research?

THERE is no question that manufacturers of chemicals are increasing the scope of their research, and especially along the line of insecticides and fungicides. When we stop to think of the enormous losses to crops, animals, and human life, as a result of attacks by fungi, bacteria, and insects, it is not difficult to understand the interest in chemicals as they apply to pest control. To be sure, great progress has been made during the past 50 years, but we are still lacking in attaining the goal of a safe, effective, and practical control of most pests.

With the present disturbed conditions, which may involve the whole world, we are confronted with the possibility of human diseases which may result in losses of life far greater than those from man-made weapons. And a majority of these fatal diseases are insect borne.

The possibility of plague, more dreaded, and perhaps responsible for the loss of greater numbers of lives than any other disease, is carried by the rat flea. Control is dependent upon the control of the rat and the flea which it harbors. The immediate significance is borne out in a story in Science (August 8, 1941) which we quote as follows:

"A warning that the United States may have a plague epidemic to combat is issued by the American Medical Association through an editorial in its journal published recently. While typhus is being held in check only with the greatest difficulty in Europe and may have reached epidemic proportions in Poland and the Balkans, the Journal states that 'no doubt plague, as far as this country is concerned, is a problem of greater potentiality.'

"Plague is present on the Pacific coast, not as human cases, but in fleas of rats, ground squirrels and marmots. From these sources it is feared that the dread disease can spread to cause an epidemic in human beings when conditions become suitable.

"Long-continued and careful plague control, involving rat-proofing of buildings, trapping, poisoning and examinations of dead rodents, must be practiced in any area in which plague had appeared.

"The consequences may be tragic if there is not a careful integration of the plague control activities of cities, counties, states and the Federal Government, with the use of trained personnel and the appropriation of adequate funds.

"The four horsemen of the apocalypse—war, hunger, disease and death—travel with the increased speed of mechanized transportation. Sudden and wide-spread outbreaks of disease arising from hidden infections are more likely than ever. The insulation of this country from the disease consequences of war will prove a colossal task and will require the most careful planning and effort."

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Roach Control

A Study of the Relative Efficiency of Various Commonly Used Insecticide Dusts Against Roaches

By HAMILTON LAUDINI *and* HARVEY L. SWEETMAN,
Massachusetts State College

EDITOR'S NOTE: *Reprinted from Soap & Sanitary Chemicals, June, 1941.*

REPLIES to a questionnaire received from one hundred pest control operators and manufacturers of insecticides regarding the composition of roach powders, formed the basis for a recent discussion of this subject in this publication[1]. A wide difference of opinion was expressed by both pest control operators and manufacturers as to the most desirable insecticide material or combination of materials which should be used. We have tested a number of the materials and combinations discussed in *Soap & Sanitary Chemicals* (1940) as part of a more extensive experiment on insecticidal control of roaches. One portion of this work has been published[2]. The dusts were applied in two ways, both simulating the methods used by pest control operators.

The first method utilized a runway formed by folding a piece of heavy wrapping paper over the edge of a 2"x4" plank 14' in length. The corners were sharply folded where the paper passed over the edge of the plank. Then two similar planks were laid flat and the folded paper placed between them. Again the paper was folded at the inside top corners of the planks so that a paper runway about 2" wide, 2" deep, and 14' long was formed. Finally strips of glass were laid over the paper and supported by the planks so that the roaches could be observed as they passed along the runway.

When it was desired to make a test, the glass was removed and the dust applied evenly over the bottom and to some extent on the sides of the paper runway with a salt shaker. The size of the openings in the salt shaker was regulated by placing paper under the screw cap and punching holes of the desired size so as to secure an even deposit of dust. The size of the holes was varied depending upon the dust combination that was being used. Approximately four grams of dust were sprinkled in the runway for each test.

The roaches were collected from the stock cages in small wide-mouthed bottles and liberated into one end of the runway. As they emerged at the opposite end, they entered a similar container in which they were retained for observation to determine the speed of action and mortality from the dust. Roaches were forced to pass through the runway with the assistance of a light and by striking the glass above the roach. Generally, little difficulty was experienced in getting them to run through the poison. However, some of the roaches, particularly the German roaches, ran over the dust the full length of the runway and yet very little poison adhered to their bodies. When one test series was completed, the runway was discarded and a clean paper runway set in place. This test should give some indication of the effectiveness and speed of action of the various poisons, comparable to practical con-

Table 1. The results from liberating American roaches in a runway treated with various insecticidal dusts.

		Sodium Fluoride + Pyrethrum								Na_2		*Pyrethrum + Borax*	
Hours		90	87	83	80	71.5	66.6	*Pyre-*	*Rote-*	*Si*		75	50
to kill	*NaF*	10	13	17	20	28.5	33.3	*thrum*	*none*	F_6	*Borax*	25	50
0- 12	..	..	..	..	1	..	..	..	..	..	..	..	..
13- 24	1	3	..	1	5	5	12	4	..	..	..	2	1
25- 36	3	..	..	1	..	..	..	1	1	..	..	..	..
37- 48	5	..	..	1	1	1	5	3	2	..	..	1	3
49- 60	1	..	1	1	3	..	..	..	..	..	..	..	1
61- 72	2	2	1	..	..	..	2	1	..	..	..	..	..
73- 84	..	1	..	..	2	..	2	..	..	..	..	..	..
85- 96	1	..	..	2	2	1	1	..	..	..	..	..	..
97-108	..	..	..	..	2	..	..	..	..	..	..	..	..
109-120	2	..	2	1	1	1	..	..	..	1	1	..	1
121-132	..	..	..	..	..	..	..	..	..	..	..	..	..
133-144	7	1	1	..	..	..	..	..	..	..	1	1	1
145-156	..	..	..	..	1	..	1	..	..	..	..	..	..
157-168	1	..	1	..	..	..	..	..	..	..	..	..	..
Survived 7 days	6	1	2	1	2	0	3	11	5	11	5	4	1
Total	29	8	8	8	26	8	26	20	8	12	7	8	8
Per cent killed	79	88	75	88	92	100	89	45	38	8	29*	50	88
Average hours to kill	87	58	107	62	51	44	42	34	37	112	127	68	86

*100% mortality in 14 days.

Table 2. The results of dusting American roaches with insecticidal dusts in screen cages with a hand duster.

		Sodium Fluoride + Pyrethrum								
Hours	*Sodium*	90	87	83	80	71.5	66.6	50	*Pyre-*	*Sodium Silico-*
to Kill	*Fluoride*	10	13	17	20	28.5	33.3	50	*thrum*	*Fluoride*
0-24	21	4	4	9	31	5	32	5	3	0
25-48	8	5	3	1	4	..	..	..	6	3
49-72	3	..	1	..	..	..	2	..	..	3
Survived 3 days	8	0	1	1	1	3	6	3	0	3
Total	40	9	9	11	36	8	40	8	9	9
% killed	80	100	89	91	97	63	90	63	100	67
Hours to kill	25	27	29	17	17	15	18	15	29	46

[1]Anon. What composition for roach powders? Soap 16, Nos. 10 and 11:92, 96, 1940.

[2]Sweetman, Harvey L. Tests for toxicity of arsenicals and sodium fluoride to the American roach, *Periplaneta americana* L. Can. Ent. 73:31-34, 1941.

trol methods where the roaches must run over the dust to be affected.

The second method consisted in placing the desired number of roaches in screen cages about 1′ square and dusting the roaches with a hand duster. This procedure resulted in much more poison adhering to the roaches than in the runway treatments. This method should give results somewhat comparable to applications with mechanical dusters by pest control operators.

The roaches were collected in nearby buildings. Most of them were used immediately following capture, but a few were kept in stock cages for longer periods.

The poisons and combinations of poisons tested are shown in the tables. The pyrethrum and rotenone were fresh products and were kept dry and in tight containers during the period of the experiments. The manufacturers designated the following percentages of active ingredients:

Pyrethrum	0.9 pyrethrins
Rotenone	5.0
Sodium Fluoride	75.0 NaF
	1.5 Na_2SiF_6
Sodium Silicofluoride	75.0
Borax	99.0

The effectiveness (percentage of mortality) and speed of action (hours to kill) will be considered in comparing the different compositions of roach powders used in these tests. All tests were conducted at the room temperature and moisture.

Two species of roaches were used in the tests, the American roach, *Periplaneta americana* L., and the German roach, *Blattela germanica* L. Both species of roaches demonstrated that the laboratory and cages used in these tests provided suitable environments. The roaches not only lived for several weeks, but young hatched and survived in the cages. Since the relative effects of the poisons on the two species were somewhat different, the results with each species will be discussed separately.

American Roach

American roaches that had passed through the runway dusted with sodium fluoride showed no immediate ill-effects. Their only reaction was to clean their appendages and body, but this also occurs if the roaches are dusted with inert dusts. Therefore, it is possible that sodium fluoride causes little or no chemical disturbance to the roach immediately after application. The average number of hours required to kill with sodium fluoride is rather slow compared to pyrethrum, rotenone, and mixtures of pyrethrum with sodium fluoride, but more rapid than either sodium silicofluoride or borax (Table 1).

Mixtures of pyrethrum and borax killed at about the same rate as sodium fluoride. It seems evident from the data that pyrethrum and borax when mixed acted separately, the early kill being produced by the pyrethrum and the later kill by the borax. However, pyrethrum and borax mixtures were more rapid killing agents than either sodium silicofluoride or borax alone. In only one instance did the time necessary to produce death with pyrethrum or sodium fluoride or mixtures of these compounds approach the amount of time necessary with sodium silicofluoride or borax. These latter two poisons were very slow in producing death.

The effectiveness of sodium fluoride alone as shown by the percentage of mortality in 7 days is somewhat less than most of the mixtures of sodium fluoride and pyrethrum and one mixture of borax and pyrethrum (1 to 1), but far superior to either pyrethrum, rotenone, sodium silico-

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fluoride, borax, or borax and pyrethrum (1 to 3). Pyrethrum, rotenone, sodium silicofluoride, and borax when used alone did not prove to be effective insecticides against the American roach under the conditions of the test. However, the percentage of mortality from borax at the end of 14 days was 100 per cent.

When sodium fluoride, pyrethrum, sodium silicofluoride, and mixtures of sodium fluoride and pyrethrum were applied with a hand duster in the cage treatments, a larger amount and noticeably better distribution of poison on the roaches was obtained than in the runway treatments. Consequently the speed of action was much greater (Table 2). Sodium fluoride and pyrethrum again killed much more rapidly than sodium silicofluoride. Mixtures of sodium fluoride and pyrethrum containing from 17 per cent to 50 per cent pyrethrum killed more rapidly than sodium fluoride alone. Pyrethrum gave a complete kill in 2 days in these treatments, which was superior to that of sodium fluoride in 3 days.

All mixtures of pyrethrum and sodium fluoride containing from 10 per cent to 33 per cent of pyrethrum, with one exception, gave a higher percentage of mortality than sodium fluoride alone. The short duration of the tests may have prevented the development of higher percentages of mortality from sodium fluoride and sodium silicofluoride.

American roaches tested in the runway with pyrethrum showed immediate responses after passing over the dust. Most of the roaches ran frantically around the glass bottles in which they were retained for observation for several minutes. Frequently they would fall on their backs, being unable to right themselves for the time being. However, many of the roaches eventually recovered sufficiently to regain their feet and a few survived the treatments. Pyrethrum dusted directly on the roaches gave a quicker kill and none of them recovered. The immediate reactions were similar to those treated in the runway.

The speed of action of pyrethrum against the American roach was very rapid, giving a quicker kill than any other insecticide used (Tables 1 and 2). It was very effective when applied directly on the roaches with a duster, but relatively ineffective in the runway tests. Apparently it is relatively ineffective after three days also.

American roaches that ran over mixtures of sodium fluoride and pyrethrum showed the combined effects of both poisons (Table 1). The quick, paralyzing action of pyrethrum was evident during the first two or three days and the prolonged effectiveness of sodium fluoride continued for several days after the pyrethrum had ceased to function. This was most evident when the mixtures contained from 17 per cent to 33 per cent pyrethrum. Higher percentages of mortality resulted from these mixtures than from either poison alone. This mixture is commonly recommended for roach control, which is supported by our results. The increased effectiveness may be due partially to the increased activity produced by the pyrethrum. The amount of moisture given off by roaches treated with pyrethrum, presumably because of increased activity, was evident on the sides of the glass cages, but was not observed on cages containing roaches treated with sodium fluoride alone. This increased humidity may have aided penetration of one or both poisons. With the exception of one test, the time to kill correlated with the percentage of pyrethrum in the mixture (Table 1). Another trend that was evident was the correlation between the prolonged effectiveness and the amount of sodium fluoride, the greater the amount of fluoride the more prolonged the toxic effect. Thus, it appears that the ingredients in these mixtures act separately and mutually in producing mortality of the roaches.

Table 3. The results of liberating German roaches in a runway treated with various insecticidal dusts.

			Sodium Fluoride + Pyrethrum										Pyrethrum + Borax
Hours to Kill	NaF	90 10	87 13	83 17	80 20	71.5 28.5	66.6 33.3	50 50	Pyrethrum	Rotenone	Na_2Si_6	Borax	50+50
0- 12	5	2	2	2	..	..	..	..	..	..	..	..	..
13- 24	6	1	2	1	5	3	6	4	..	..	..	..	..
25- 36	1	1	2	..	1	1	..	2	..	1	1	1	..
37- 48	..	..	..	..	..	..	1	..	..	..	1	..	..
49- 60	1	1	..	..	..	..	..	..	..	..	..	..	..
61- 72	4	..	..	..	..	..	..	..	..	..	3	2	1
73- 84	..	1	..	..	..	..	..	..	..	..	..	..	1
85- 96	1	..	..	2	..	..	..	..	1	..	..	..	..
97-108	..	..	..	..	..	2	..	..	..	..	..	..	..
109-120	..	..	..	..	..	..	..	..	1	1	1	1	..
121-132	..	..	..	..	..	..	..	..	..	..	..	1	2
133-144	..	..	..	..	..	..	..	..	..	..	..	..	1
145-156	..	..	..	..	..	..	..	..	..	..	..	..	..
157-168	..	..	..	..	..	..	..	..	..	1	..	..	1
Survived 7 days	0	0	0	0	0	0	5	0	14	2	1	1	0
Total	18	6	6	5	6	6	12	6	16	6	6	6	6
% killed	100	100	100	100	100	100	58	100	13	67	83	83	100
Average hours to kill	32	32	17	43	22	49	20	21	101	73	71	83	117

Table 4. The results of dusting German roaches with insecticidal dusts in screen cages with a hand duster.

Hours to Kill	Sodium Fluoride	Pyrethrum + NaF 50% + 50%	Pyrethrum	Sodium Silico-Fluoride	Rotenone
0- 12	7	2	..	..	..
13- 24	2	6	2	..	..
25- 36	..	1	6	..	..
37- 48	..	..	..	..	..
49- 60	..	..	..	3	2
61- 72	..	..	..	..	2
73- 84	..	..	..	..	..
85- 96	..	..	..	..	1
97-108	..	..	..	..	..
109-120	..	1	..	2	2
121-132	..	..	..	..	..
133-144	..	..	..	..	..
145-156	..	..	..	1	..
157-168	..	..	..	..	..
Survived 7 days	0	0	1	4	3
Total	9	10	9	10	10
% killed	100	100	89	60	70
Average hours to kill	9	28	29	87	86

German Roach

Treatments of the German roach in the runway demonstrated that

sodium fluoride killed rapidly (Table 3). The addition of pyrethrum to sodium fluoride usually increased the speed of action of the powders, but the results are not consistent. Pyrethrum, rotenone, sodium silicofluoride, borax, and pyrethrum and borax were much slower killing agents than sodium fluoride. Sodium fluoride and mixtures of sodium fluoride and pyrethrum, with one exception, killed all of the roaches treated. Pyrethrum alone was very ineffective, but when mixed with borax (1 to 1), 100 per cent mortality resulted. Since borax alone killed a high percentage of the roaches in one week, the mortality from the mixture of pyrethrum and borax probably was due largely to the borax. Sodium silicofluoride killed 83 per cent of the roaches, while rotenone destroyed only 67 per cent. Thus pyrethrum and rotenone were relatively ineffective against the German roach under the conditions of the test.

German roaches in cages were treated with sodium fluoride, pyrethrum, sodium silicofluoride, rotenone, and a mixture of sodium fluoride and pyrethrum (1 to 1). Sodium fluoride killed much more rapidly than the other poisons (Table 4). Pyrethrum produced a more rapid kill than sodium silicofluoride or rotenone. Sodium fluoride and a mixture of sodium fluoride and pyrethrum killed 100 per cent of the roaches, while pyrethrum alone also produced a high mortality. Rotenone and sodium silicofluoride were not very effective. Pyrethrum stimulated the roaches to increased activity immediately after treatment in both the runway and cage tests.

The speed of action was greater in the cage tests than in the runway tests. Since noticeably more poison

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Table 5. A comparison of results obtained from laboratory tests with those drawn from statements expressed by pest control operators and insecticide manufacturers.

Poisons	Effectiveness: Lab. Tests	Effectiveness: Soap	Speed of Action: Lab. Tests	Speed of Action: Soap
Sodium Fluoride	90%	Excellent	38 hrs.	Fair
Sodium Fluoride + 20% Pyrethrum	96%	Excellent	30 hrs.	Good
Sodium Fluoride + 28.5% Pyrethrum	88%	Excellent	36 hrs.	Good
Sodium Fluoride + 50% Pyrethrum	88%	Excellent	31 hrs.	Fast
Pyrethrum	62%	Good	48 hrs.	Fast
Rotenone	58%	Good	65 hrs.	Slow
Borax	55%	Poor	105 hrs.	Slow
Borax + 75% Pyrethrum	50%	Good	68 hrs.	Fast

*100% mortality in 14 days.

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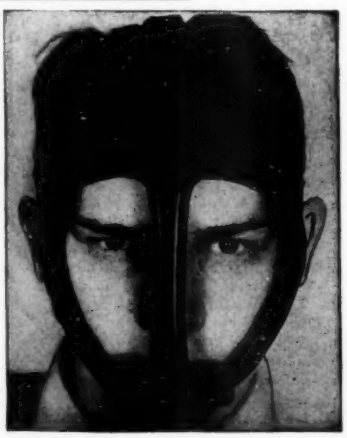

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and better distribution on the roaches were obtained in the cage tests, the result was to be expected. Sodium fluoride and mixtures of sodium fluoride and pyrethrum were the most effective under both methods of treatment. Pyrethrum was much more effective in the cage tests, while rotenone and sodium silicofluoride produced similar results in the two tests.

Discussion

The German roach was much easier to kill than the American roach with the poisons tested. Sodium fluoride was the most effective against the German roach, but was slightly less effective against the American roach. Pyrethrum alone was not very effective against either species in the runway tests, but was very effective if the dusts were applied directly on them. The addition of pyrethrum, from 10 per cent to 33 per cent of the total, to sodium fluoride increased the effectiveness of the poisons against the American roach and gave complete kills against the German roach. Pyrethrum and borax mixtures showed some promise against both species, but the slow action of the borax is objectionable.

A comparison of the results obtained from our tests and the summary reported in *Soap and Sanitary Chemicals* (1940) are shown in Table 5. The figures in the table were obtained by averaging the data obtained in the runway and cage tests for both species of roaches. Our results for the most part are in agreement with the summary in *Soap and Sanitary Chemicals.*

Sodium fluoride, and mixtures of this material and pyrethrum were considered as having "excellent" effectiveness (percentage of mortality). Our results show this to be true as the lowest percentage of mortality in this group of dusts is 88. Our data show that the other compositions are inferior to the above. However, our figures do not justify giving pyrethrum, rotenone, and borax and pyrethrum mixture (1 to 3) such a high rating as "good." Borax, which was rated as "poor," proved to be nearly as effective at the end of one week as those three compositions and at the end of two weeks was far superior.

A comparison of the speed of action of sodium fluoride, sodium fluoride and pyrethrum, rotenone, and borax shows that our results correlate quite closely with the speed of action given in *Soap and Sanitary Chemicals* (1940). Pyrethrum, on the other hand, was much slower than sodium fluoride and mixtures of sodium fluoride and pyrethrum, but faster than rotenone and borax. In our tests the quick paralyzing effects of pyrethrum were evident. This fact may be the reason for classifying it as having a "fast speed of action. Since many of the roaches that were "knocked down" lived for many hours, while others recovered and survived the tests, it seems that the "fast" rating is somewhat high for this poison.

No Mouser, He Wins $409

Peekskill, N. Y.—When a man bites a doughnut and finds a mouse inside instead of jelly, he is entitled to $409 damages, Judge Salvatore T. Gambino ruled today in City Court. Judge Gambino made the award to Philip Battaglia, a distillery worker, who sued the Mohican Company, 832 South Street, Peekskill, for $2,000 after finding the rodent in a doughnut he purchased last July 2.

—Herald-Tribune.

And all over the upland and lowland
The charm of the goldenrod—
Some of us call it Autumn
And others call it God.

—William Herbert Carruth.

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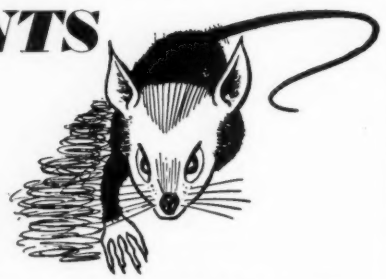

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It's all explained in the new Larvacide Instruction Sheet packed with every bottle — and jam full of information invaluable to the fumigator • Write for a case of 12 one lb. bottles right now, with trade discount to fumigators.

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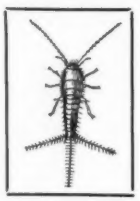

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(3) One pound will treat completely—three 2-room apartments, two 3-room apartments, or a basement room 20x20.

(4) It has fulfilled every claim made for it, under the worst conditions known. Write for testimonials.

(5) "NEW LOW PRICES"—$1.40 per pound, f.o.b. Seattle, Washington. Minimum amount 10 pounds. Shipped express.

(6) *Don't envy the exterminator who can guarantee the above performance, be one!!!*

U. S. INSECTICIDES CO.

412 Hoge Building Seattle, Washington

Ancient Mariner a Battery Visitor

Spins Yarns of Rats Playing Hide-and-Seek On Craft in the Moonlight

By T. WALTER WILLIAMS

Ben Fidd, the veteran watchman of the Chelsea piers, N. Y., who sailed the seas that washed the shores in all parts of the world, paid a visit to the Battery sea wall yesterday accompanied by his grandson, Ben Fidd, 3rd, who usually accompanies him on his rambles.

Young Ben told his grandad that he had read in a newspaper that some of the crew of an oil tanker had complained about rats coming out in the foc'sle and climbing on the lid of their seachests to make faces at the sailors.

Tells of Rats at Play

"Sonny, I could spin you a yarn about the rats that I saw in my sailing ship days but some people might think that I was lying and I promised my dear old grandmother who brought me up that I would never tell a lie if I could help it.

"Sailing craft, especially the wooden ships, were full of rats. They lived in the hold and came on deck to get water. I've seen them on fine moonlight nights when we were in the 'doldrums,' playing hide and seek around the deck just like school kids.

"One rat would hide behind a harness cask the salt horse was in and the others would scamper aft and get behind the water-tank. Then one would give a loud squeak as a signal to the one behind the cask to come and find them, which it did pronto as sailors used to say then."

"Ratcatchers," said Ben, Sr., "used to board the ship at the home port and catch a few sackfuls of the varmints, but they took care to let a fair number go free to keep the ball rolling."

"When I've been at the wheel in the middle watch, which we used to call the 'graveyarder,' because it was the most lonesome in the night, I've seen half a dozen big rats come out in the cabin and empty a full bottle of colza oil that was standing on the table. Two of the biggest rats would stand on their hind legs and brace their bodies against the bottle while another put its long tail down the neck and fed the oil to the others until it was all gone."

Artful Egg Pinching

"The way the rats used to pinch eggs from a basket on the cabin table was still more artful," Mr. Fidd continued. "One big rat lay on its back on the table as an anchor, while another one twined its tail around his body and others helped to make a living chain down to the deck so the cunning little animals could pass the eggs from one to another with their forepaws, without breaking them."

"The best yarn about rats," he went on, "was the old one of how the rodents changed ships at Singapore. The rats coming down from Japan, China, Korea, Siam and Saigon would never go west of Singapore and those coming from Europe and America would never go east of that port.

"I know that yarn is true because I saw it happen myself fifty years ago when I was an A. B. on the clipper ship Dudley Buck, from 'Frisco for Shanghai. Two British mail steamships were alongside the Tanjong Pagong wharf. One bound for Yokohama and the other one for London.

"I was standing on the wharf at sundown talking to the bo'sun when he said 'Hells-bells, Ben, look at the rats coming down the mooring lines of that steamship.' I saw them climbing down to the pier carrying small packages which looked like nests and some appeared to be carrying their young. We looked at the other mail steamer and saw a similar procession of rats climbing up the bow rope and going aboard through the port hawspipe."

—*N. Y. Times.*

Farmers Want Crow Week

Washington—Farmers of Hamilton township, Mercer county, N. J., want a national crow week declared to protect crops.

The farmers want a week set when licensed gunners, sportsmen, farmers and all men in CCC camps would turn out to exterminate crows.

Representative D. Lane Powers, Republican, of New Jersey, has sent the petition to the Department of Agriculture and asked for a report on the proposal.

—*New York Sun.*

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GAS MASK
with the
ALL-VISION FACEPIECE

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THE WORLD'S LARGEST BOTANICAL DRUG HOUSE

"Poison" or "Insecticide" in Economic Entomology

By S. MARCOVITCH, *Tennessee Agricultural Experiment Station, Knoxville*

UNTIL some 25 years ago the chemical knowledge of an economic entomologist consisted chiefly of the arsenicals, such as paris green and lead arsenate, and nicotine sulphate. The arsenicals were known as "stomach poisons" for the control of chewing insects, whereas nicotine was recommended as a contact poison to control insects of the sucking type.

A considerable development in the use of chemicals for the protection of plants has taken place. A wide variety of insecticides are now employed, some of which are distinctly nonpoisonous. The insecticide trade must know how to label its insecticides for the protection of the public.

Insecticides, like antiseptics, are chemicals, but it is interesting to note that the physician prescribes antiseptics or drugs while the economic entomologist thinks and publishes in terms of poisons.

That there exists much confusion in literature in regard to the terminology of "poison" and "insecticide" is evident. This situation has developed without the entomologist being fully aware of the consequences. A perusal of the literature will reveal many illustrations, a few of which were picked at random.

First of all, let us examine the textbooks. In a widely used text there is a chapter on "Contact Poisons." Under this heading there are discussions of such insecticides as nicotine sulphate, pyrethrum, sulfur, lubricating oils, soaps and derris.

In another textbook we find in the portion dealing with "Insect Control" this statement: "Discussion of insecticides commonly group them, for this reason, as "Stomach Poisons" and "Contact Poisons." Under the former are discussed the arsenicals, fluorine compounds, phenothiazine, rotenone, and nicotine.

A writer in the **Journal of Economic Entomology** refers to copper arsenate in one sentence as an insecticide and in the next sentence as "the poison."

In an excellent and notable contribution to our sciences one of our prominent entomologists begins his review by a conspicuous heading entitled "Stomach Poisons," and then proceeds to discuss arsenical compounds, cryolite, rotenone and other insecticides. The next prominent heading is "Contact Poisons" under which are discussed sulfur, alcohols, petroleum oil sprays and others. His fourth heading, "Insecticides of Plant Origin," is a much better one.

In a Farmers' Bulletin, under the heading of "Insecticides," a paragraph is devoted to the "Stomach Poisons, such as calcium arsenate, cryolite and paris green" and "Contact Poisons, such as pyrethrum, soap, and nicotine sulphate."

In an extension bulletin from an eastern state occurs the following: "The stomach poisons include lead arsenate, calcium arsenate, paris green, cryolite, and the fluosilicates. The contact poisons are nicotine, pyrethrum, and derris."

In a Farmers' Bulletin on disinfecting seeds there is a heading "Mercury Compounds" under which it is stated: "The chemical corrodes metals; therefore nonmetalic containers made of wood, glass or enamelware should be used." In an entomological textbook this same subject of containers is referred to as follows: "This poison should be mixed in glass or wooden vessels."

These citations illustrate the hold the word "poison" has acquired in the literature.

Definitions of Poison.—If we are going to shake our selves loose from that word "poison" we should at least know the definition for the word. The New York state law on pharmacy terms any chemical a poison that is liable to be destructive to adult human life in quantities of 60 grains (4 grams). According to this definition, the soluble arsenicals and fluorides such as sodium fluoride and sodium fluosilicate should be classed as poisons because they have been known to cause death in quantities of approximately 4 grams. There will always be people who through carelessness or accident will swallow roach or rat poison. To prevent such accidents a "poison" label should be placed on these two fluorides.

Sollman, in his Manual of Pharmacology, gives this definition: "A poison is any substance which by its ordinary action is capable of destroying life or of seriously endangering health when it is applied to the body

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10 lbs.—$4. 25 lbs.—$7.
50 lbs.—$12. 100 lbs.—$20.
For the extermination of mice

Phosphorus Paste
10 lbs.—$4.25. 25 lbs.—$9.
50 lbs.—$17. 100 lbs.—$32.50.
For the extermination of rats and roaches

Bird Repellent
10 lbs.—$6. 25 lbs.—$13.50.
50 lbs.—$25. 100 lbs.—$45.
Keep buildings free of roosting birds

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externally or in moderate doses (to 50 grams) internally." Even under this broad definition many insecticides such as pyrethrum, soap or cryolite can not be classed as a "poison." Animals fed cryolite in single doses equivalent to 1½ pounds for a human being did not succumb. This compound even though in use for a long time is not even mentioned in books on pharmacology or toxicology. No fatalities from cryolite have ever been recorded in the literature. Cryolite (Na_3AlF_6) contains aluminum which has been found to act as an antidote to fluorine poisoning. In our laboratories we have been able to save animals from a lethal dose of sodium fluoride by incorporating aluminum sulfate. This combination forms cryolite. We have discovered that the very soluble sodium fluoborate with 70 per cent soluble fluorine is entirely non-toxic to rats and insects. It appears that both boron and aluminum form complexes which tie up the fluorine and render them non-poisonous.

It is very evident that the various fluorides differ greatly in solubility and the European laws recognize these differences by holding that sodium fluoride and sodium fluosilicate are poisonous whereas cryolite is classified as non-poisonous. When

MODERN

"I knew this hotel in the horse and buggy days."

"Everything is different now."

"Yes, the horse died and they hired an exterminator."

acute toxicities are compared cryolite is found to be much safer than caffeine, the alkaloid of coffee, or than common drugs such as aspirin, acetanilid, and quinine. The minimum lethal dose per kilogram of these materials is as follows: Caffeine, 360 mg., salicylic acid, 300 mg., acetanilid, 700 mg., and quinine, 200 mg. Sodium fluoride has an M.L.D. of 200 mg. per kilo. Many fatalities have been reported with these drugs, yet they are sold in all drugstores without poison labels. Many drugs are now sold with caution labels warning against exceeding the recommended dosage. A caution label appears to be all that is necessary for cryolite. Such a label might read "The contents of this package are to be used for insecticidal purposes and not to be taken internally."

Since some foods such as sprayed apples may contain meager amounts of fluorine, there arose a fear that mottled enamel might become widespread. Since 1932 and until recently, the toxicity of fluorine was emphasized with little regard for the possible useful qualities of fluorine in nutrition. During the past two years a considerable amount of literature has appeared showing that fluorine may have most important tooth-preservative properties.

As is well known teeth are higher in fluorine content than other parts of the body. Armstrong and Brekhus (1) analyzed sound and carious teeth and found the fluorine content of the former to be 111 parts per million, as compared with 69 for the latter. Dean (2) made a study of dental caries in Galesburg, Illinois, a mottled-enamel area, and in Quincy, Illinois, a nearby section without mottled enamel. The children of Galesburg showed a reduced incidence of caries.

Conclusion.—In Entomological literature one can easily find sulfur, pyrethrum, cryolite, lubricating oils, soaps, and other innocents referred to as "poisons." As a result spray residues have already had more than their share of apprehension by the public.

(Continued on Page 30)

Stop TERMITE DAMAGE with CHIPMAN DRY SODIUM ARSENITE

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In order to prevent misunderstanding, it would be well to substitute the word "insecticide" for "poison," and to talk and write about controlling insects and applying remedies or treatments or baits rather than killing and poisoning them.

It is evident that there is room for improvement in the terminology employed on the subject of insecticides. Perhaps this matter should receive special attention by a committee acting for the organization of economic entomologists—5-12-41.

—*Journal of Economic Entomology.*

Literature Cited

Armstrong, W. D., and P. J. Brekhus. 1938. Possible relationship between fluorine content of enamel and resistance to dental caries. Jour. Dental Res. 17:393.

Dean, H. Trendley. 1940. Fluorine, mottled enamel, and dental caries. Jour. of Pediatrics 16 (6):782-94.

Chloroform For Insect Bites

Writing in a recent issue of Science, Dr. W. A. Hoffman tells of his experience in the use of chloroform to allay the itching irritation caused by many insect bites. He concludes that, "It is believed sufficient evidence has been accumulated to justify calling attention to the palliative potentialities of chloroform against the toxins injected by mosquitoes and other noxious arthropods. It deserves a trial for flea bites and schistosome dermatitis, provided of course, the areas involved in the case of the latter are not too extensive."

Tell me the prevailing sentiments of your young men and I'll tell you the character of the next generation.

—Edmund Burke.

THE CHEC CO.

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The Field Roach *Blattella vaga*

By R. A. FLOCK, *University of Arizona, Tucson*

The field roach, **Blattella vaga** Hebard, is one of the least known of the introduced roaches in the United States. It was first recognized by Dr. Ball who collected it at Phoenix. The species was described from Ball's specimens in 1935 by Morgan Hebard (Hebard 1935), who considers it to have been introduced because its nearest relative is found in India.

One reason that this roach is not better known is that it has been confused with the common German cockroach **Blattella germanica**. It is very similar to that species in general appearance. It can be most easily distinguished by the blackish brown area on the face from mouth parts to between the eyes. This species is slightly smaller and more olivaceous in coloration than is the German roach.

Blattella vaga is very common in most of the irrigated regions of the Lower Sonoran Zone in southern Arizona. Although it was first recognized as distinct in 1933, the writer has specimens taken at light in Phoenix in 1928 where it is very well established. The roach was first found in the Santa Cruz Valley at Tucson during 1939 and is apparently to be found all along this valley down into the Salt River Valley. The distribution also includes the Gila Valley and the Colorado Valley. It is very common at Yuma, at Somerton, Arizona, and at Bard, California, and was collected by Dr. R. H. Beamer north along the Colorado River at Blythe, California. Dr. L. P. Wehrle has evidence which indicates that it may be found as far west as San Diego, California.

Typically, this roach is an inhabitant of irrigated fields and yards but is found in lesser numbers out on the dry desert. It is easily found under stones, plant debris, clumps of dirt and other objects. In the early spring months up until about the end of April all stages may easily be found near the surface of the ground. Later in the season because of the heat they are harder to find. The species appears to be associated to a considerable extent with decomposing vegetation and probably feeds largely on this material. The writer found this species in greatest abundance about decaying dates on the ground in a grove at Yuma. In the laboratory this roach will do considerable damage to tender plant parts, such as newly emerged seedlings. On the other hand, it shows some tendency to eat plant lice. It is probable that this roach is not very important in the field.

During the dryer seasons of the year the roach may come into houses in great numbers. This movement, for the purpose of obtaining moisture, is usually temporary. It does, however, remain in houses and breed there to some extent, and is carried from place to place in baggage. In the house its feeding habits are quite similar to those of the German roach. This roach is quite conspicuous in the house because it does not seem very sensitive to artificial light, and will wander around in the evening where it can be seen easily. It is also quite common around street lights and show windows. The field roach appears to be less wary than the German roach and is much more easily caught.

The practice of piling up cut grass and other mulch against foundations is apt to increase greatly the number of roaches entering the house. Several house infestations have been eliminated by the simple method of removing decomposing plant material from around the foundation.

Summary.—The field roach, **Blattella vaga** Hebard, is quite common in the Lower Sonoran Zone in Arizona. It occasionally does damage to plants or is a nuisance in houses. This roach is very closely related to the domiciliary German roach and possibly represents an intermediate stage in the acquisition of domiciliary habits.—1-2-41.

—*Journal of Economic Entomology.*

Literature Cited

Hebard, Morgan. 1935. Studies in the Orthoptera of Arizona. Trans. Am. Ent. Soc. 61:112-4.

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Entomological Literature

DIRECTIONS FOR POISONING THIRTEEN-STRIPED GROUND SQUIRRELS

Prepared in the Division of Predator and Rodent Control, U. S. Department of the Interior, Fish and Wildlife Service, Washington, D. C. Wildlife Leaflet 195—July, 1941. This leaflet supersedes Leaflet Bi-1162 issued in August, 1931, by the Bureau of Biological Survey, under the Department of Agriculture.

DIRECTIONS FOR CONTROLLING TREE SQUIRRELS

Prepared in the Division of Predator and Rodent Control, U. S. Department of the Interior, Fish and Wildlife Service, Washington, D. C. Wildlife Leaflet 197—August, 1941. This leaflet supersedes Leaflet Bi-1163 issued in August, 1931, by the Bureau of Biological Survey, under the U. S. Department of Agriculture.

Mosquito Fight Pushed

Major Irving V. A. Huie, local WPA Administrator, announced yesterday that President Roosevelt had approved a $579,488 WPA program for the elimination of mosquito-breeding areas on publicly and privately owned property in New York City.

Chemical Formulary, Volume V

It seems unbelievable that despite the previous publication of four previous volumes of the CHEMICAL FORMULARY, it should have been possible to collect enough new and different tested formulae—literally thousands of them—for a fifth book. The latest edition, like its predecessors does not duplicate a single formula that was in any of the previous volumes.

The formulas are those used in commercial concerns and have been collected through the efforts of a board of editors of 45 outstanding chemists. These editors, most of whom are connected with commercial firms, experiment stations or American colleges and universities add considerable authority to the book.

The ground covered in this volume is more comprehensive than that of any previous one and the editor has done an excellent job in this compilation. In a ready reference and brief form he has placed before the layman as well as before the specialist much information that might otherwise necessitate a great deal of time to ferret out.

The book is not one of formulas alone but is written in a crisp and intensely interesting explanatory fashion which enhances its value to any private or industrial library. The fact that many practicing chemists engaged in one field of work are not familiar with the formulas in another field and that much study and practice must go into compiling unfamiliar formulas makes this volume a ready source book of information.

Of special interest to the readers of this journal would be the chapter devoted to FARM AND GARDEN SPECIALTIES. In addition to these subjects the following are discussed in great detail: ADHESIVES, BEVERAGES, COSMETICS AND DRUGS, EMULSIONS AND DISPERSIONS, TEXTILES, FIBRE, SOAPS, CLEANERS, FOOD, INKS, LEATHER, SKINS, FURS, LUBRICANTS, OILS, FATS, MATERIALS OF CONSTRUCTION, METAL AND METAL TREATMENT, PAINTS, ENAMELS, VARNISHES, LACQUERS, PAPER, PHOTOGRAPHY, POLISHES, PYROTECHNICS AND EXPLOSIVES, RUBBER, RESINS, PLASTICS, WAXES, MISCELLANEOUS.

Volume V does not supersede but adds to the information given in the four preceding volumes of the set and we urge every reader to possess the complete series and to keep adding each new volume as it is available. Price $6.00.

Order from PESTS—512 E. 14th St., Kansas City, Mo.

Fleas Throw Wrench Into Auto Repairs

McKeesport, Pa.—Trucks of the McKeesport street department are not being repaired these days—because the dog pound is next to the city garage.

The garage workmen went on a sitdown strike because fleas from the dogs in the pound were unbearable.

"Have you ever tried to use a monkey wrench and slap fleas at the same time?" inquired one striker. "And if you think we're yapping about nothing come over and listen to these dogs."

—*N. Y. World-Telegram.*

Rat and Mice Exterminating Liquid

Per-Mo Rat and Mice Exterminating Liquid can be used as a drink or can be mixed with any food and used as a bait.

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Per-Mo Mothproofing Treatment will prevent moth and carpet beetle damage to Upholstered Furniture, Carpets, Rugs, and Clothing for FIVE YEARS and to Blankets that are laundered for a period of THREE YEARS.

Per-Mo Mothproof is a colorless and odorless liquid, that is applied to any woolen fabric with a spray-gun, either electrically or hand powered. Write for full particulars.

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LOCAL ORGANIZATION NEWS

Indiana PCOs Meet

The regular bi-monthly meeting of the Indiana Pest Control Operators Association met at Purdue University, Lafayette, Indiana, September 20, President Maurice Bailie presiding. The following were present: Maurice Bailie, L. C. Baxter, A. D. Bosley, J. J. Davis, H. O. Deay, W. S. Gibson, H. B. Jordan, G. E. Lehker, Bert Lewis, John Lewis, C. O. Partlow, E. E. Purdy, G. W. Reuter, R. S. Trueman, and O. K. Williams.

Following a short business meeting, wherein the San Francisco Convention, Regional Conferences, the forthcoming PCO booklet, and Insecticide Priorities were discussed, the remainder of the day was given over to the second of a planned series of subjects to be a major feature of each meeting.

The subjects discussed and demonstrated by charts, chart and blackboard illustrations, models and specimens, were as follows: External Anatomy and the Relation to Control, by G. E. Lehker; Internal Anatomy and the Relation to Control, by H. O. Deay, and Development, Reproduction and Adaptations of Insects, by J. J. Davis. It was possible to go into considerably more detail than at the annual conference. Metcalf and Flint's Destructive and Useful Insects, which has been obtained by most if not all in attendance, will be the first text used.

The group had lunch together at the Mitzi Restaurant, now being operated by O. K. Williams, formerly a well-known commercial operator of Peoria, Illinois.

Indiana State PCO Association Starts Course in Basic Principles of Entomology at Their Meeting Sept. 20, 1941

At the regular meeting of the Indiana Pest Control Operators Association on September 20, in Agriculture Hall, Purdue University, Lafayette, Ind., a definite plan of study of the basic principles of entomology was inaugurated. The first meeting was devoted to a discussion the first six chapters of Metcalf and Flint's book "Destructive and Useful Insects." This course will extend over a period of several regular meetings of the association, with study assignments made for each meeting in advance.

Maurice Bailie and C. O. Partlow, President and Secretary respectively, of the Indiana Association, commend and express appreciation to Prof. Davis and his staff for their great interest, and for giving unstintingly of their time and effort on behalf of their association.

The meeting was well attended and much of real value was covered.

The course idea has interesting potentialities for the entire industry and the results of the experiment above noted will be well worth watching. The Indiana Association is to be complimented on its progressive spirit.—ED.

St. Louis Pest Control Association

The St. Louis members held their meeting September 2, at the York Hotel. This has been their first meeting since June and a few items have transpired that required attention.

Mr. Davis, who has been connected with the Huttig Sash & Door Termite Division for some time due to his illness during the past summer has sent in his resignation as Secretary of the Association. Mr. E. Ganter, of the Home Reconditioning Co., was elected to fill Mr. Davis' unexpired term of office.

Due to the exceptional busy summer very little has taken place. It is expected that the meetings will be held regularly as soon as cooler weather starts.

The advertiser who cancels too soon loses the most valuable part of his investment. —*Printers' Ink.*

WHAT'S NEW IN PEST CONTROL-PERSONALS

George R. Elliott's Father-in-Law Dies: Herman Frederick Klingele, 78, of 162 West Street, Worcester, Mass., passed away in City Hospital. A graduate of Worcester Polytechnic Institute, he had been employed as a draftsman by some of New England's leading concerns. In 1928 he designed and patented an automatic crank pin grinder. Mr. Klingele was a member of Worcester Mechanics Association. He retired in 1935. Sincerest condolences to Mr. and Mrs. Eliott on their grievous loss.

Maryland State Board of Health Adopts Fluoride Regulation: All insecticides containing Sodium Fluoride or other salts of hydrofluoric acid must be colored Nile blue according to a regulation adopted recently by the Maryland State Board of Health.

Pigeon Control: There is an anti-pigeon device called Stanley's Patented Pigeon Proofer, which its inventor, Stanley Peles, claims cannot harm the birds in any way. The device is made and sold by Stanley's Roofing and Building Service, Inc., 523 W. 184 St., New York City. The principle of the gadget consists of a series of wires of unequal length fixed upright on the pigeon perch. The ends of the wires are looped over, so no sharp point is presented on which an unwary pigeon could injure itself.

If the pigeon did overcome the difficulty of trying to glide into a landing amidst the thicket of four and five-inch-long wires, it would find itself unable to close its wings or reach a solid footing with its feet, it is said, thus causing the bird to hop off and find a more hospitable building.

PARENTS

Kalends of July, 1941, offers the following: "In her school essay on 'Parents' a little girl wrote: 'We get our parents when they are so old that it is impossible to change their habits'."

Flies carry 30 diseases; cause 75,000 deaths annually.

STOP—LOOK—LISTEN

HOUCHIN'S PAT. CYCLONE

Are you getting the proper share of the retail powder business?

Wide awake exterminators meet their overhead by filling our Insect Powder Blowers and selling direct to the consumer.

The investment is small, the profits large.

A trial order will convince you.

Thos. W. Houchin Corp.
87 Ferry Street Jersey City, N. J.

"GOOD" DISINFECTANTS

Pine Oil Disinfectants Coefs. 3 and 4
Phenolic Emulsifying Disinfectants Coefs. 2 to 20
Soluble Cresylic Disinfectant
Coef. 2.5 (B.A.I. Specifications)
Saponated Solution of Cresol
U.S.P. XI (Cresol Compound Solution)
All made under careful laboratory control. Phenol coefficients determined by LaWall and Harrisson Laboratories.

OTHER "GOOD" PRODUCTS

Insect Sprays
Cattle Sprays
Bed Bug Sprays
Agricultural Insecticides
Vegetable Oil Soaps
Liquid Soaps
Scrub Soaps (Liquid & Jelly)
Floor Wax and Polishes

BULK PACKAGES AND PRIVATE LABEL

JAMES GOOD, INC.
Manufacturing Chemists—Since 1868
2121 E. SUSQUEHANNA AVE. PHILADELPHIA, PA.

Pest Control in the News

MOLES

QUESTION—My lawn is being ruined by moles. How can I get rid of them?

ANSWER—Push moth balls or castor bean seeds into the runways. The moles dislike the odor and will stay away.

RATTAN FURNITURE

QUESTION—I contemplate buying rattan furniture for my glass-enclosed porch, but have been told that rattan breeds termites. What is your opinion?

ANSWER—No kind of furniture can breed termites, for these come only from nests in the ground. Furniture is sometimes attractive to borers, or powder-post beetles, but rattan gives no more trouble than anything else.

DIGGER WASPS

QUESTION—What can be done about large bees or wasps that dig in a lawn and throw up huge piles of dirt?

ANSWER—As soon as a hole is started, drop one or two moth balls into it.

POISON IVY

QUESTION—Poison ivy is growing in my rock garden among rock vines that I wish to preserve. How can I destroy it without harming other plants?

ANSWER—In practically every locality there is some one who is immune to ivy poisoning, and who can be hired to uproot the vines. Grubbing the roots is the only sure way to destroy the pest.

CLEANING HOUSE

QUESTION—I have bought an 80-year-old frame farmhouse on fieldstone foundations. Before moving in, I would like to clear the house of mice, bedbugs, and other insects that may be in the walls. Could I do this myself? Or is it advisable to get an exterminator? Is sulphur generally used for fumigation?

ANSWER—It will be best to have the job done by a professional exterminator, who will undoubtedly use cyanide gas. This will require the house to be tightly closed for two or three days, but will do a better job than anything else. It is so deadly that it can be used only by experienced professionals.

CARPENTER ANTS

QUESTION—There are nests of carpenter ants in the soil around pine trees. How can I kill them without injurying tree roots and nearby plants and grass?

ANSWER—Use a variety of ant traps containing substances that the ants will carry back to the queens on the nests and which will kill them. These traps are in many forms, varying from tin boxes to a clear jelly.

—*New York Sun.*

"Perfection consists not in doing extraordinary things, but in doing ordinary things extraordinarily well."

—Antonio Stradivari.

Rat Bite Fails to Awaken Woman

Mrs. Marie Moore is 72 and lives at 1653 Madison Ave., where she and her 5-year-old grandson, Salvatore Rojos, were sleeping in their fourth-floor apartment at 6 a. m. recently when a rat came into their room.

The rat climbed up on Mrs. Moore's bed and bit her on the left cheek.

Mrs. Moore slept on.

The rat then climbed over to the child and bit him on the right thumb. That woke up Salvatore and he screamed so loud that Mrs. Moore awoke.

When Dr. Nightingale of Beth David Hospital arrived to treat them Mrs. Moore said she never felt the bite.

—*New York World Telegram.*

Sand Fleas Make Things Miserable

Elmira, N. Y.—Legions of "sand fleas" make life miserable for housewives in scattered Elmira areas, with meter readers reporting hundreds of basements infested.

First of the flea hordes to invade houses came with a heat wave in mid-July.

Insects Can Be Lured By Scents of Female Sex: Luring pests to their doom with scents that falsely promise mating, is the suggestion put forth in German entomological circles according to an item in Die Umschau.—*Science News Letter.*

"OPEN SEASON" FOR FUMIGATION ACCIDENTS IS HERE!

ADEQUATE INSURANCE PROTECTION IS AS IMPORTANT AS GUARDS AND WARNING SIGNS

Tomorrow's Policy Will Not Cover Today's Accident

PROTECTION and SECURITY

May Be Had Through Dependable

INSURANCE

FOR THE

PEST CONTROL INDUSTRY

Policies issued in REPRESENTATIVE AMERICAN STOCK COMPANIES operating in all states.

Public Liability *Workman's Compensation*
Termite Guarantees *Products Liability*
And All Allied Lines

Cooperating with National and All Local Pest Control Associations.

B. & D. A. WEISBURGER

1440 BROADWAY NEW YORK CITY

Dependable Insurance Service Since 1915

SOLVAY

TRADE MARK REG. U. S PAT. OFF.

PARA-DICHLOROBENZENE

. . . for MOTHS

ORTHO-DICHLOROBENZENE

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● Available for quick spot shipments from over 100 stock points!

In the rush season, delays hamper operations and cost you money! Solvay distribution service on Para-dichlorobenzene and Ortho-dichlorobenzene is available from over 100 stock points and branch offices . . . making sure that your orders are promptly filled and sent to you *without delay*. Write or telephone to the nearest branch office listed below or to

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WRITE FOR THESE BOOKLETS

The latest helpful information service literature will be sent to you without cost or obligation. If in addition there are any particular pieces of literature offered by advertisers in this issue you are interested in receiving, either write them direct, or if you prefer, please send us such requests.

Please note, however, that you must request each booklet on a separate letterhead though they must all be mailed in one envelope addressed to Pests, 126 Lexington Avenue, New York City, N. Y.

FLEA-KILLER

Descriptive circular of insecticide for fleas, lice, ticks on dogs and cats. Small package line for over the counter sale to your customers. Profit possibilities discussed.

WRITE PESTS—J-O.

COOLING ZYKLON DISCOIDS

Manufacturer makes some pertinent suggestions on pre-cooling of Discoids in hot weather in order to slow up evolution of the gas from the discs.

WRITE PESTS—AC-52.

MOLE KILLER PELLETS

Circular describes mole killer pellets which manufacturer states requires no traps, no gas, no exposed poison. Diagram of runways and explains how mole lives. Testimonial letters.

WRITE PESTS—Carajon.

DOLLARS AND DISINFECTANTS

A leaflet captioned "Dollars and Disinfectants" discusses a product which manufacturer claims is being very effectively used for general sanitation. It is a powerful disinfectant that has the added advantage of safety. It is powerful because it has a phenol coefficient of 20, meaning that it is 20 times more powerful than pure phenol.

Those interested in this product, which is non-corrosive to skin and metals, non-inflammable, and non-injurious to fabrics or materials, may write for a ¼ lb. sample on their letterhead.

Write PESTS—Merck.

CRAWLING INSECTS

Discusses bedbug control; roach control; carpet beetle control. control of insects that attack stored products, etc.

Write PESTS—Rohm.

DRY SODIUM ARSENITE

Circular descriptive of its use for Grasshopper Bait, Weed Killer, Mormon Cricket Dust, Tree Killer, Termite Control, Wood Preservative. Method of treating foundation timbers and treatment of infested timbers. FREE COPY MAY BE HAD BY ADDRESSING CHIPMAN, c/o PESTS.

INSECTICIDE SOLVENT

Leaflet describes solvent which manufacturer states is absolutely odorless and stays odorless; 100% volatile; will not stain; completely refined; exceeds NAIDM Specifications; greater killing power.

WRITE PESTS—Pennsylvania.

WHAT OF MORIBUND KILL?
By Russell B. Stoddard

TEST METHODS FOR RECORDING MORIBUND KILL
By Dr. H. E. Whitmire

Informative brochure which discusses the importance of the so-called Moribund "Kill" as a factor in rating the value and effectiveness of household insecticides and insecticide materials. These two articles correct misapprehensions that may be extant and contribute to the simplification and clarification of the question.

YOUR COPY MAY BE HAD BY ADDRESSING D & O, c/o PESTS.

M.S.A. NEW FACEPIECE FOR GAS MASKS

Manufacturer claims following advantages: Provide maximum useable lens area; restrict dead air space to the minimum; prevent fogging of lenses; keep weight as low as possible; eliminate "pressure points" that cause headaches and fatigue due to soft rubber, moulded rubber facepiece that follows contour of face with minimum of tension of headbands.

For further data write MINE, c/o PESTS.

Soldiers Evade Bugs By Making Hammocks

Haynesville, La. — Some 20,000 soldiers bivouacked here recently in this cotton-growing town and you'd never guess what part of their pay checks went to purchase.

Answer: Every bit of plowline rope, all hoe handles and every sack in town were bought by soldiers who made hammocks so they could sleep off the ground free from bugs. —*New York World Telegram.*

There is no situation as dangerous as that of the advertiser who has arrived and sits back to enjoy his well-earned days of business ease.—*Printers' Ink.*

Business Opportunities
(Classified)

RATES — For individuals seeking employment, 5c per word, minimum $1.00. All others 10c per word, minimum, $2.00. All advertisments must be in the hands of the publishers seven days before publication date and must be accompanied by cash or money order for payment in full. The publishers are not responsible for any false or misleading advertisments.

Replies to advertisements where box number only is indicated should be addressed c/o Pests, 512 E. 14th St., Kansas City, Mo., giving box number as well.

BUSINESS WANTED—Experienced operator can pay cash for established business with a good reputation. Address B-3, c/o PESTS.

OPPORTUNITY—Established extermination business in one of New England's largest insurance cities and industrial areas. Excellent profits. For particulars, address Box 15, c/o Pests.

LOCK...FOR ANY DOOR
— A *Guard for Fumigators*

You can't afford to be without them.

MFG. BY
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7700 Carnegie Ave., Cleveland, Ohio

1941 Brush Catalog!

READY

Our new 1941 brush catalog is now ready for distribution. We show the most complete line of brushes in the U. S., including floor brushes and miscellaneous items for the janitor trade. Ask for your copy of this big catalog today.

FLOUR CITY BRUSH CO.
MINNEAPOLIS MINNESOTA
PACIFIC COAST BRUSH CO.
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SELL THE NEWEST ITEMS IN SANITARY SUPPLIES UNDER YOUR LABEL

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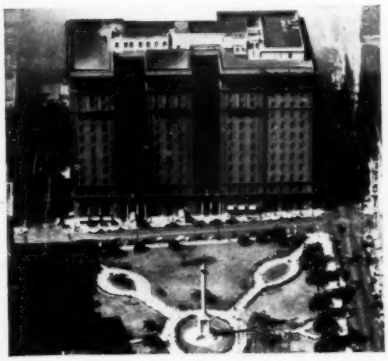

OCTOBER 27 - 28 - 29

NATIONAL PEST CONTROL ASSOCIATION CONVENTION

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HEADQUARTERS

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Management—DAN E. LANDON

OVERLOOKING UNION SQUARE

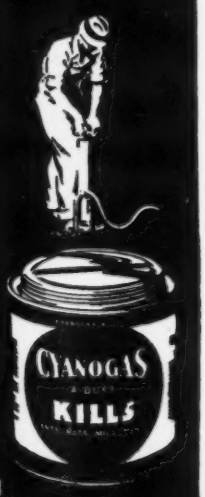
BETTER KILLS **BETTER JOBS** **BIGGER PROFITS**

For Fumigating Use ZYKLON DISCOIDS

No more guesswork. Do better jobs with this handy packaged fumigant. ZYKLON DISCOIDS are ready for instant use. Open the can and scatter the discs into rooms to be fumigated. No corrosive liquids and no dangerous residue. DISCOIDS give off a powerful gas that penetrates into every crack and crevice—kills insects wherever they may be. Send for "Zyklon Discoids Fumigation Manual"—FREE.

For Rat Control Use CYANOGAS

This is a powder giving off a gas —NOT A BAIT. Kills rats and mice *instantly*. Successful where baits and other means fail. Simply pump the powder into the rat holes. The gas liberated penetrates to all parts of the runs. With a Cyanogas-Foot-Pump-Duster and CYANOGAS A-DUST you can make big profits. Special ruggedly built duster $5.75. Write for free booklet on rodent control.



American Cyanamid & Chemical Corporation

Insecticide Department

30 ROCKEFELLER PLAZA, NEW YORK, N. Y. KANSAS CITY, MO., AZUSA, CALIF.

NO CHANGE IN PRICE OF

MORTICIDE

Prices of chemicals are going higher and higher because of National Defense needs. Many of the chemicals that are used directly by the Pest Control Operators are on the Priority list, and chemicals such as Borax, Cresylic Acid, Cresol, and Perfume Oils are hard to obtain.

However,

MORTICIDE

can be used today by all Pest Control Operators at no change in price. You are therefore assured of a highly efficient insecticide for bedbugs at the same price as before.

MORTICIDE has been used by Pest Control Operators in practically every state, and the steady increase of users attests to its efficiency and killing power.

We will be glad to quote you prices on any quantity that you require, and on contract protecting your steady supply at a uniform price.

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